Petroleum Tank Release Fund

An analysis of issues surrounding the solvency of the Fund

A Report to the Legislative Finance Committee and the Environmental Quality Council

Petroleum Tank Release Fund Subcommittee
2007-08 Interim

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Petroleum Tank Release Fund Subcommittee
A joint subcommittee of LFC and EQC

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Overview

The Petroleum Tank Release Fund Subcommittee, a joint body of the Legislative Finance Committee (LFC) and the Environmental Quality Council (EQC), met on May 13, 2008, and June 4, 2008, to consider issues surrounding the solvency of the Petroleum Tank Release Fund (the Fund), which posted a $2.4 million shortfall in FY 2007.

The Fund is the default payor for cleanup of releases (spills, leaks) from underground and aboveground petroleum storage tanks, as well as home heating oil tanks. In FY 2008, the Fund continues to fall short in paying for submitted cleanup plans. A total of $4.54 million has been paid in FY 2008, including $1.86 million in deferred payments from FY 2007. Another roughly $2.8 million in submitted plans remains outstanding, while the Fund estimates that it has another $5 million in liabilities that has yet to be submitted. These estimates are for tank releases that are known. They do not include releases that have yet to be discovered.

The Petroleum Tank Release Fund is the default payor for cleanup of releases (spills, leaks) from underground and aboveground petroleum storage tanks, as well as home heating oil tanks.

This report is a summary of the subcommittee's work and information gathered thus far. The subcommittee is asking the LFC and EQC to review this work and provide direction as to how to proceed. The subcommittee does not feel, at this time, that its purpose is to recommend legislation, but would be willing to do so, if directed.[1] Conversely, the subcommittee feels that it could be appropriate for the committees of the whole to review the issues surrounding the Fund's solvency and backlog in payments for cleanups.

[1] The subcommittee report was approved for publication by the EQC on September 9, 2008, but the EQC gave no further direction that the subcommittee should continue its work or develop legislative proposals.

The subcommittee has taken no position on any of the proposals to increase revenue and improve the Fund's solvency.

The Petroleum Tank Release Compensation Board (the Board), a citizen board that oversees the Fund, has proposed legislative changes for the 2009 Session as a way to increase revenue and improve the Fund's solvency. These include raising the fuel tax that finances the Fund to a full cent per gallon (currently it's $.0075/gallon) and raising the deductible that tank owners and operators pay to the Fund for their portion of cleanup costs when a release occurs. The subcommittee has taken no position on any of these proposals.[2]

The subcommittee has also learned that the Montana Department of Environmental Quality (DEQ) has agreed to participate in a voluntary audit of 14 state petroleum cleanup programs by the U.S. Environmental Protection Agency (EPA) this year. The involved programs represent those with the largest backlog of cleanups in the country, or the greatest percentage backlog in their region, as is the case for Montana.

[2] On September 9, 2008, the EQC did approve, for purposes of pre-introduction, a bill draft proposal from the DEQ, which would incorporate several of the proposals made by the Board.

Findings

Task: Examine the backlog in payments from the Petroleum Tank Release Fund for cleanup at petroleum release sites

Finding 1: Petroleum tank owners and operators rely on the Fund as the default payor for cleanups, instead of the payor of last resort.

Finding 2: Payments are limited to available Fund revenue, generated by a $.0075/gallon fuel tax. The tax does not generate enough revenue to cover all existing cleanup plans.

Finding 3: The backlog is caused by the lengthy amount of time that it takes for a cleanup and ground water monitoring to be completed, in accordance with water quality standards followed by the DEQ. These standards are defined in documents known as "Circular DEQ-7" and "Technical Guidance Document #7".

Finding 4: The Fund is using a prioritization system to pay for cleanups at the most hazardous sites first; lower priority sites languish, unable to be closed.

Finding 5: There is disagreement between industry, the Board, and the DEQ as to the extent that cleanups should occur, in order to facilitate more site closures.

Finding 6: The EPA encourages states to use a "risk-based" approach in cleaning up petroleum releases, allowing contaminants to remain in the soil or ground water if they pose no risk of spreading or causing harm.

Finding 7: Montana uses a "risk based" approach to develop site cleanup plans. But if contaminants exceed water quality standards followed by the DEQ, a risk based approach isn't used to close the site. Contaminants can't remain as long as the water quality standards aren't met.

Finding 8: Revenue from the existing fuel tax is likely to remain flat or decline as motorists reduce their consumption in response to rising fuel prices. For that same

reason, it's unlikely that the Legislature would pass a fuel tax increase, as proposed by the Board.

Finding 9: Montana is not ready to transition to a system that requires tank owners and operators to obtain private insurance to pay for petroleum cleanups. Experience with private insurance has been mixed in other states, where some insurers are declining to cover petroleum releases or are taking long periods of time to pay claims.

Finding 10: Increasing the deductibles that are applied to cleanups paid by the Fund, as proposed by the Board, would result in higher out-of-pocket costs or insurance premiums for tank owners and operators.

Background

The subcommittee is a joint body of the LFC and the EQC, which have both heard past reports about the solvency of the Fund. There has been general concern for several years about the future of the Fund, which was the subject of a legislative audit published in November 2003. The audit recommended that Montana transition from reliance on the Fund to private insurance coverage. The audit said the Legislature could consider options that would ease the transition, including an interim reinsurance/excess coverage program. To date, this has not occurred. Ten other states have transitioned to private insurance.[3]

National Snapshot of State Cleanup Funds

Montana is not alone in its difficulty. Nine states have cleanup funds for which outstanding claims exceed the available account balance.[4]

There has been general concern for several years about the future of the Fund, which was the subject of a legislative audit published in November 2003.

Owners of federally regulated underground storage tanks are required by the EPA to have the financial means ($1 million) to pay for cleanup costs and third-party damages caused by releases from their tanks. Federally regulated tanks include those (and their connecting pipes) with a capacity greater than 1,100 gallons. They do not include home heating oil tanks and farm or residential tanks with a capacity of less than 1,100 gallons used for noncommercial purposes. Although exempt from federal regulation, those kinds of tanks and aboveground storage tanks are, under Montana statute, eligible to be covered by the Fund.

Private insurance, self-insurance, bonding, and other resources can be used by tank owners and operators to comply with the EPA's $1 million "Financial Responsibility" requirement. State funds, whose operations are approved by the EPA, like Montana's,

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[3]Summary of State Fund Survey Results, Vermont Department of Environmental Conservation, June 2008.

[4]Ibid.

also qualify as evidence of Financial Responsibility. State funds have been the primary source of proving Financial Responsibility since the late 1980s. At that time, many state funds were created because of what was seen as a lack of available and affordable private insurance options, especially for "mom and pop" gas stations, and a desire to keep petroleum cleanups moving forward.

Since the mid-1990s, the national backlog of underground storage tank cleanups has been consistently declining from a high of 171,795 sites in 1995 to 108,766 at the end of FY 2007.[5] However, the number of cleanups being completed each year is also declining.[6] Last year, the EPA began an effort to better understand the reasons behind the backlog. The EPA's initial work found that 54% of all backlogged sites are over 10 years old (in Montana it's 55% [7]) and that many sites in the backlog are either owned or affiliated with a few "brand name" companies.[8] The EPA says that this suggests that by focusing on older sites or brand name companies, among other things, there may be opportunities for developing targeted strategies to address the backlog.

The EPA is continuing its audit this year by looking more closely at the 14 states with the largest backlogs in the country or the greatest percentage backlog in their region, as is the case for Montana (about 38% according to the DEQ and EPA). The audit is voluntary, and the DEQ and the Fund have agreed to participate.

Snapshot of Montana's Situation

When a petroleum release occurs in Montana, the cleanup process generally follows the chronological order outlined in **Appendix A**, a flowchart published by the DEQ, recognizing that variations can occur, depending on individual site characteristics. Generally speaking, the DEQ's role in the process is to decide how a site should be cleaned up and when it should be done. The Board's role is limited to fiscal matters only, reviewing the cost of DEQ-approved work plans and paying eligible reimbursement claims as they're submitted.

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[5] "Addressing the Cleanup Backlog: Phase 2 Study", EPA, page 1.

[6] Ibid, page 2.

[7] "Montana Backlog Background", EPA, June 4, 2008.

[8] "Addressing the cleanup backlog: Phase 2 Study", EPA, page 3.

Appendix B details payments by the Board according to the fiscal year in which they were paid and the year in which the affiliated release or releases were discovered.

As of May 7, 2008, a total of 4,414 releases have been identified in Montana since the Fund came into existence nearly 2 decades ago. Of those, 2,708 have been resolved and 1,706 remain active.[9] Historically (1990-2007), Montana has averaged 150 site closures each year. In the last 5 years, the closure rate has fluctuated between 32 and 88 a year. As of September 4, 2008, 51 sites have been evaluated for closure in this calendar year; 40 have been approved.[10]

New Releases

In 2007, Montana identified 67 new petroleum releases, 83% of which involve gasoline or diesel products. These discoveries follow the trend over the past several years in which between 50 and 70 new releases were discovered each year.[11]

Historic contamination remains the primary source of new releases, accounting for 39% in 2007. (Historic and unknown sources combine for 45% in **Figure 1**.) Historic contamination is mainly discovered through environmental assessments or unrelated construction activities, according to the DEQ. The agency also says that these releases don't provide much information to help prevent future releases because most of the historical contamination originated from older tanks systems that were constructed, installed, and operated much differently from the current equipment in service today. The DEQ expects that historic contamination will continue to make up a significant proportion of newly discovered releases. However,

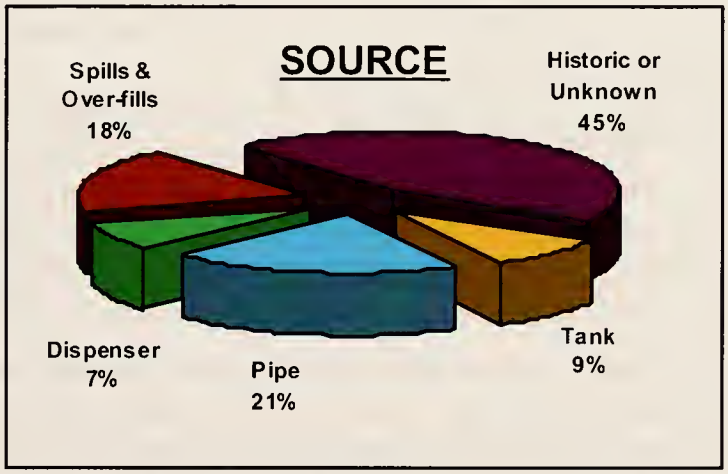

Figure 1: The sources of petroleum releases discovered in 2007, according to the DEQ.

[9] DEQ Petroleum Technical Section Activity Report, May 7, 2008.

[10] Dan Kenney, Section Supervisor, DEQ Petroleum Technical Section, Sept. 4, 2008.

[11] "Release Autopsies -- 2007", DEQ.

the agency says that there are a finite number of unknown historic contamination sites out there; so as they're found, their significance will decline over time.

The DEQ has identified piping components as the weak link in active tank systems. Retrofitting existing tank systems with secondary containment and inspecting existing secondary containment can help prevent releases to the environment.[12] The DEQ says that educating gas station employees and the public could also reduce the number of spills and overfills.

The citizen board that oversees the Fund has proposed legislative changes to improve the Fund's solvency, including raising the fuel tax to a full cent per gallon and obligating administrative costs to the general fund or another revenue source.

Revenue Generation

The Fund is currently financed with a $.0075/gallon fuel tax that has generated more than $6 million in revenue annually since 2000. Revenue is expected to remain flat or decline, given the state of the market, as motorists reduce consumption. This fall, the Revenue and Transportation Interim Committee (RTIC) will update the Fund's revenue projections. The last time that the RTIC did so in November 2006, it projected a revenue increase for the Fund of $300,000 to $500,000 between FY 2007 and FY 2009. (**See Appendix C.**)

Fund expenditures have varied between $5.5 million and $9.4 million annually since 2000. This includes an average of $1.6 million in annual administrative costs that come directly out of the Fund and that are not paid by general fund money.

The citizen board that oversees the Fund has proposed legislative changes to improve the Fund's solvency. These include raising the fuel tax to a full cent per gallon and obligating administrative costs to the general fund or another revenue source. The Board also proposes increasing the deductible that owners and operators pay when a leak occurs from $17,500 an incident to $25,000 an incident, plus 5% of the total bill between $50,000 and $1 million. The Board feels that this would encourage greater use

[12] "Release Autopsies -- 2007", DEQ.

of private insurance. The subcommittee has taken no position on any of these proposals.

The Fund has developed a prioritization system to clean up what are considered to be the most hazardous sites first. However, that leaves less funding available for lower-priority sites where cleanup efforts may be closer to wrapping up.

Current use of private insurance appears to be limited, with the Fund remaining the default payor for many cleanups at petroleum release sites.

Private Insurance

Current use of private insurance appears to be limited, with the Fund remaining the default payor for many cleanups at petroleum release sites. With mixed experience in other states, where some insurers are declining to cover petroleum releases or are taking long periods of time to pay claims, the subcommittee does not feel that Montana is ready to transition to a system that mandates use of private insurance for all tank owners and operators. Even when an insurance policy exists, some tank owners and operators acknowledge that they don't report releases to the insurer, but instead seek payment for cleanup directly from the Fund.

According to data collected through the state's permitting system for federally regulated underground storage tanks, 1,340 tank owners and operators in Montana report that they have some mechanism in place to meet the federal Financial Responsibility requirement of $1 million. Most notably, 522 claim self-insurance, 341 report that they have private insurance, and 781 rely on the Fund to show Financial Responsibility. A small number of others use mechanisms such as surety bonds, letters of credit, and trust funds.

Of the top 21 most expensive petroleum releases in Montana (costing more than $500,000 to clean up), 3 did not have insurance, the cause of 5 others was undetermined and therefore an insurer was unlikely to pay for cleanup, and 12 others went to subrogation.

Subrogation

Collecting payment from private insurance can be complicated, given that a property owner may have purchased policies from multiple insurers over the years or that a

historically contaminated property may have changed hands one or several times before the release is discovered. The Fund uses a third party to ferret out these channels of payment, a process known as subrogation. Depending on how the money is recovered (by settlement, through trial, etc), the third party is paid 22 to 25% of the recovered amount for its services, plus a $70 an hour fee.

Since 2004, the Board has recovered $1.2 million through subrogation and has paid $250,000 in fees to the third party. The Board has also paid an additional $829,000 in other legal fees and court costs. In FY 2004, these expenditures amounted to 38% of the Board's staff budget. In FY 2006, they amounted to 48% of the Board's staff budget. In FY 2008, they amounted to 23.5% of the Board's staff budget.

It appears that the Board did not actively seek to recover cleanup costs from insurance companies for any release until about 6 years ago. Several of those attempts have since gone to litigation. In 2006, the Montana Supreme Court ruled that the statute of limitations that applies to these cases is 8 years and that the clock starts running at the time that the release is discovered. In the 2006 case, the Board was seeking to recover $254,842 in cleanup costs from the insurer of a gas station in Butte. The release was discovered in 1989. The Board didn't submit a claim to the insurer until 2001. The court ruled that that was well after the statute of limitations had expired and the insurer didn't have to pay. The Board sought to have the ruling overturned. On June 3, 2008, the Montana Supreme Court affirmed its 2006 ruling, again stating that the 8 year statute of limitations applies and the clock begins at the time that a release is discovered.

Given these rulings, it appears that the Board may no longer seek insurance payments on any of the top 21 most expensive releases (to date), among others. Allan Payne, subrogation attorney for the Board, is currently evaluating releases from July 2000 to ensure that the Board files any necessary claims before the statute of limitations runs out on those cases this month. The Board didn't take similar action after the first ruling in 2006, choosing instead to try to have the ruling overturned. In the time between the court's 2006 and 2008 rulings, $11.8 million in costs surpassed the 8 year statute of limitations.

Extent of Cleanups

There is disagreement between industry, the Board, and the DEQ as to the extent that cleanups should occur. (The DEQ must approve the work plan for the cleanup of each release.) The DEQ says that Montana has stricter statutory and constitutional

environmental standards than many states, which must be met before a site can be considered "cleaned up" and closed. Industry argues that the DEQ has made its own "policy" decisions to follow more stringent protocols than required by statute and the constitution. The Board feels that "lesser" cleanups could be possible to facilitate more efficient and cost-effective site closures. The subcommittee hasn't resolved the differences in these opinions.

In Article II, section 3, the Montana Constitution grants state residents the inalienable right to a clean and healthful environment. The Montana Supreme Court has defined this fundamental right, paraphrased as follows:

> The constitutional right to a clean and healthful environment includes being free from unreasonable degradation (significant impact on the environment) . . . and this right is anticipatory and preventative in nature.[13]

This does not mean, however, that there can't be any adverse change to the environment. The Montana Supreme Court has also held that the environmental provisions of the constitution apply not only to state actions but also to private actions and therefore private parties.[14]

In statute, the provisions of Title 75, chapters 5 and 6, MCA, provide regulatory guidance regarding prevention, abatement, and control of the pollution of Montana waters. Water quality laws govern only certain state waters, including surface or underground bodies of water, irrigation systems, or drainage systems.[15] Montana water quality laws regulate every entity in the state, including individuals, businesses, organizations, and units of government. However, water quality laws regulate only certain uses, including entailing potential pollution (either point source or nonpoint source). **Appendix D** offers further discussion of these statutory and constitutional requirements.

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[13] Montana Environmental Information Center v. Department of Environmental Quality, 1999 MT 248, 296 Mont. 207, 988 P.2d 1236 (1999).

[14] Cape-France Enterprises v. Estate of Peed, 2001 MT 139, 305 Mont. 513, 29 P.3d 1011 (2001).

[15] 75-5-103(29)(a), MCA

The DEQ says that it can't close a petroleum release site until the site has met: (1) drinking water standards and health standards, as prescribed by Circular DEQ-7 (**Appendix E**) for class I, II, or III ground water; or (2) the health standards for carcinogens, as prescribed by Circular DEQ-7 for class IV ground water. These standards were developed in accordance with the Montana water quality laws and the federal Clean Water Act, with guidance from the EPA. The standards are updated as additional information or guidance from the EPA becomes available.[16]

The DEQ also follows standards for soil and ground water assessment and cleanup set forth in DEQ Technical Guidance Document 7 (**Appendix F**). Industry says that these standards are more stringent than necessary and haven't been adopted through rulemaking.

The DEQ says that it understands the burden that long-term ground water monitoring, used at many cleanup sites, can put on the Fund and the frustration that it can cause for property and tank owners, who'd like to see their cleanup resolved. The DEQ says that it's looking more closely at closing sites where contaminants could be left in the ground, if they pose no risk of spreading or causing harm. This is called "risk-based site closure".

The EPA has recommended this risk-based approach since the 1990s. The EPA recently told the DEQ that the approach has been used in other states to effect faster and cheaper cleanups, while still protecting human health and the environment.[17] Industry and the Board say to address Montana's backlog, it'll be necessary to leave contaminants in the ground where possible. Industry says that it won't support the proposal to increase the deductibles that tank owners and operators pay as part of state-funded cleanups, unless the DEQ alters its protocols.

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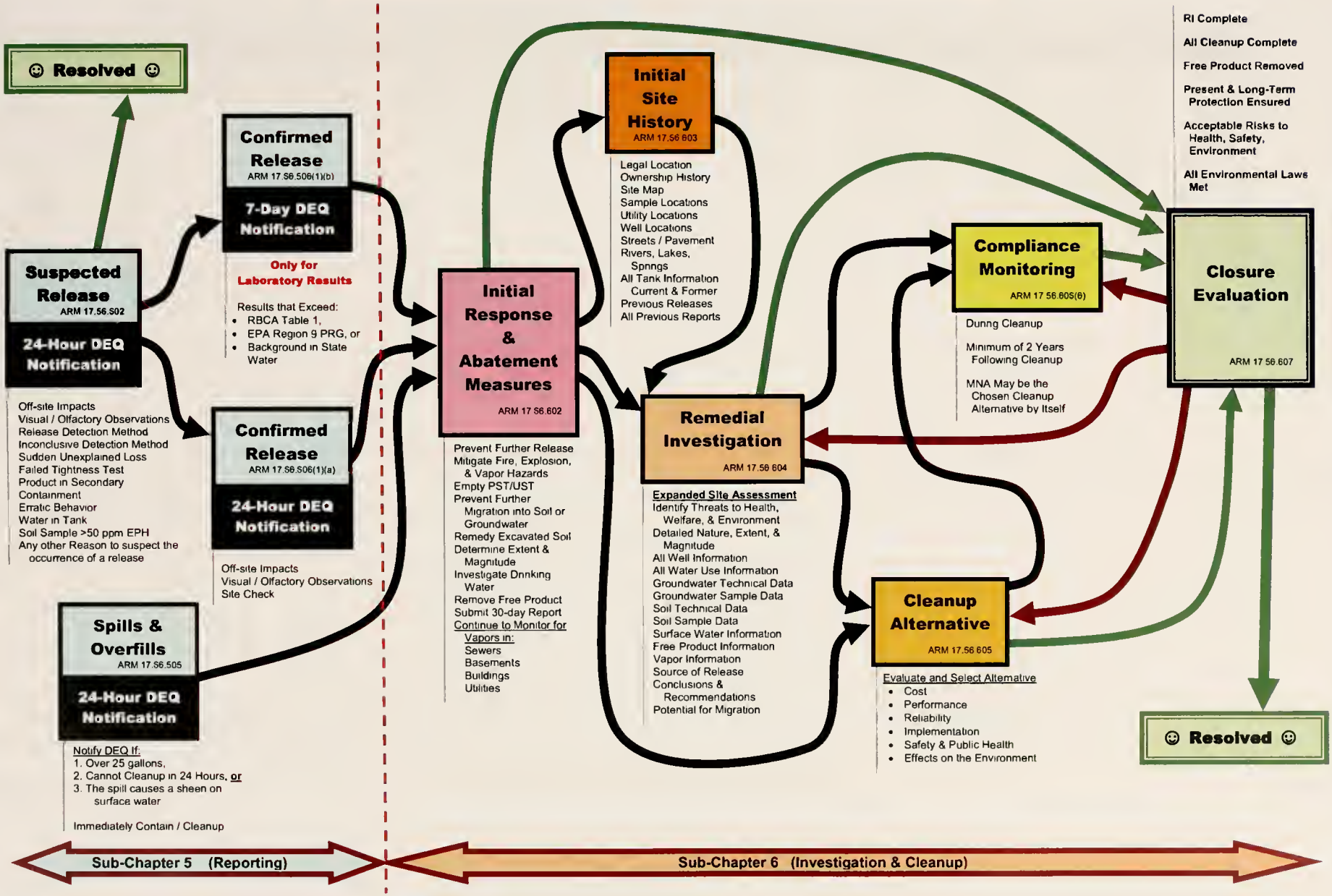
[16] Circular DEQ-7, February 2006, http://www.deq.mt.gov/wqinfo/Circulars.asp

[17] Letter from Janice Pearson, EPA Region 8 UST Team Leader to Michael Trombetta, chief of the Hazardous Waste Site Cleanup Bureau at the Montana Department of Environmental Quality, June 4, 2008.

Petroleum Release Investigation and Cleanup Processes



Appendix B

Board payments according to the Fiscal Year in which they were paid, and the year in which the affiliated release, or releases, was discovered.

Year Discovered	Eligible Releases	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999
1989	64	$73,232	$325,449	$232,194	$515,906	$647,972	$567,312	$542,900	$846,215	$223,413	$99,116
1990	135	**$249,239**	**$466,556**	**$1,162,107**	$885,852	$690,470	$1,057,651	$954,761	**$1,270,586**	$299,175	$281,162
1991	207			$608,101	**$1,018,471**	**$1,358,516**	**$2,126,928**	$1,185,894	$1,043,724	$857,037	**$530,507**
1992	155				$468,303	$689,020	$890,293	**$1,339,503**	$627,933	**$1,700,950**	$309,402
1993	146					$127,668	$844,970	$961,741	$540,001	$321,549	$238,264
1994	116						$275,092	$677,210	$700,151	$234,258	$424,544
1995	128							$440,497	$930,093	$651,119	$428,685
1996	74								$61,084	$390,347	$94,712
1997	86									$161,441	$146,256
1998	144									$2,170	$164,956
1999	120										
2000	48										
2001	37										
2002	36										
2003	48										
2004	40										
2005	45										
2006	24										
2007	33										
	Totals	$322,471	$792,005	$2,002,403	$2,888,533	$3,513,645	$5,762,246	$6,102,506	$6,019,788	$4,841,459	$2,717,603

Appendix B

Board payments according to the Fiscal Year in which they were paid, and the year in which the affiliated release, or releases, was discovered.

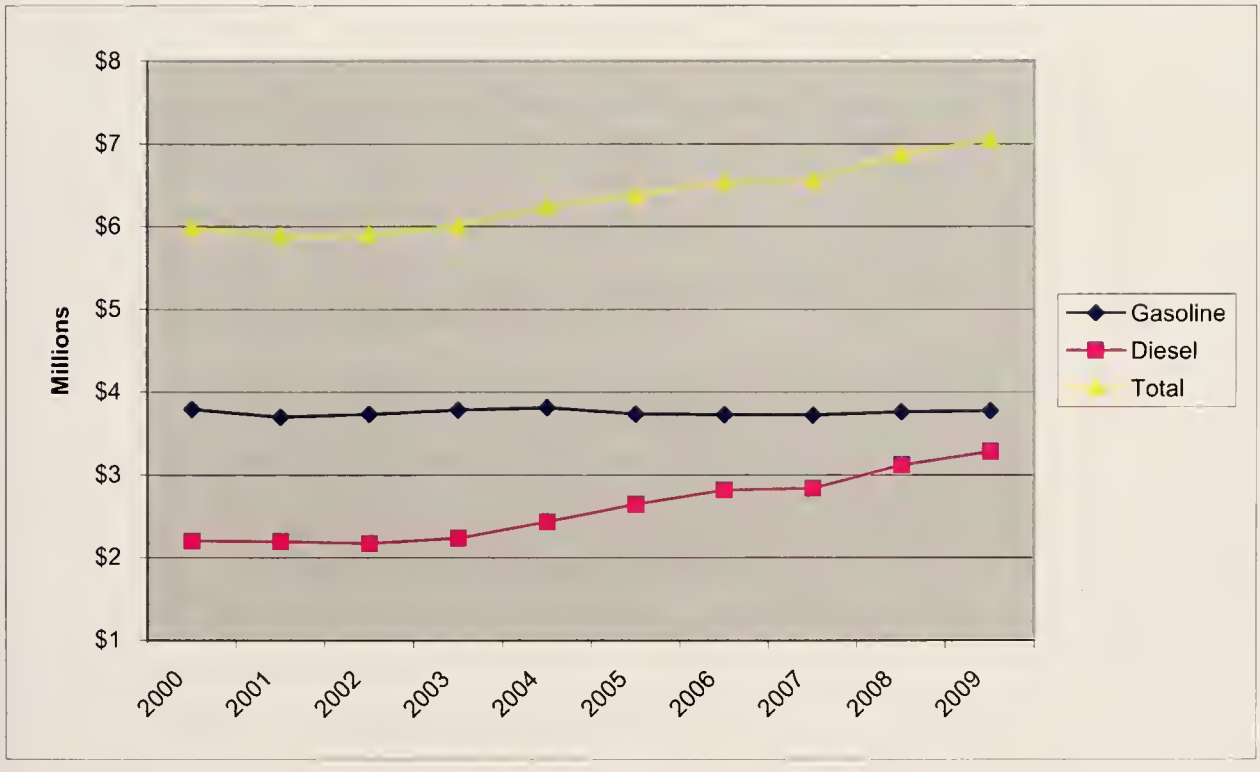
FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	Total	Average	Per Eligible Release
$84,973	$115,679	$253,125	$104,538	$140,419	$141,805	$62,022	$221,670	$135,565	$5,333,505	$280,711	$83,336
$583,950	$681,717	$281,944	$176,876	$238,565	$204,353	$419,697	$260,419	$180,040	$10,345,120	$544,480	$76,631
$714,271	$874,121	$688,257	$293,421	$334,506	$275,651	$406,381	**$833,355**	$183,374	$13,332,515	$784,266	$64,408
$245,394	$317,717	$202,305	$252,024	$217,675	$223,227	$273,832	$190,250	$125,550	$8,073,377	$504,586	$52,086
$262,977	$231,298	$328,760	$243,686	$324,797	$555,214	$442,262	$484,716	$212,920	$6,120,823	$408,055	$41,923
$592,314	$370,163	$303,176	$155,861	$264,286	$379,469	$202,376	$161,222	$121,953	$4,862,074	$347,291	$41,914
$230,435	$436,668	$232,011	$466,052	$181,556	$264,842	$228,367	$227,101	$265,159	$4,982,585	$383,276	$38,926
$588,647	$330,482	$541,200	$297,688	$312,365	$304,091	**$607,886**	$412,583	$587,958	$4,529,043	$377,420	$61,203
$316,122	$777,350	$465,824	$350,283	**$680,470**	$309,133	$266,271	$327,720	$329,375	$4,130,243	$375,477	$48,026
$1,177,097	$1,187,518	$487,354	$450,771	$654,964	**$611,170**	$421,389	$414,323	$926,787	$6,498,499	$590,773	$45,128
$296,573	**$1,280,539**	**$745,739**	**$493,792**	$459,009	$566,918	$644,317	$438,813	**$1,166,632**	$6,092,332	$676,926	$50,769
	$903,080	$343,219	$168,533	$105,849	$169,973	$125,469	$265,523	$126,692	$2,208,339	$276,042	$46,007
		$483,641	$115,850	$341,305	$375,705	$214,240	$191,624	$248,002	$1,970,367	$281,481	$53,253
			$148,674	$211,836	$141,549	$302,120	$265,834	$389,327	$1,459,340	$243,223	$40,537
			$1,791	$357,541	$353,942	$451,751	$426,158	$340,992	$1,932,174	$322,029	$40,254
					$123,612	$284,094	$385,703	$177,977	$971,387	$242,847	$24,285
					$12,828	$191,991	$149,366	$293,329	$647,514	$161,878	$14,389
						$425	$316,035	$298,127	$614,587	$204,862	$25,608
								$129,204	$129,204	$129,204	$3,915
$5,092,753	$7,506,330	$5,356,555	$3,719,839	$4,825,142	$5,013,481	$5,544,889	$5,972,415	$6,238,966	$84,233,029		

Appendix C

Petroleum Tank Compensation Fund Revenue

Source: Legislative Fiscal Division Revenue Estimates
as adopted by the Revenue and Transportation Interim Committee, Nov. 2006

Revenue in Millions				
	Fiscal Year	Gasoline	Diesel	Total
Actual	2000	3.787577	2.195544	5.983121
Actual	2001	3.695472	2.186868	5.882340
Actual	2002	3.729461	2.166408	5.895869
Actual	2003	3.779058	2.231647	6.010705
Actual	2004	3.808254	2.430673	6.238927
Actual	2005	3.733539	2.644022	6.377561
Actual	2006	3.726893	2.814517	6.541410
Actual	2007	3.719684	2.835273	6.554957
Forecast	2008	3.757318	3.114766	6.872084
Forecast	2009	3.772621	3.276697	7.049318



Appendix D

Prepared by Todd Everts, Legislative Environmental Policy Analyst

The Petroleum Tank Release Fund Subcommittee requested a list of legal constraints under which the DEQ is operating with respect to underground storage tank site remediation and closure. The constitutional and statutory legal constraints are summarized below.

Montana Constitution

Montana's constitutional environmental provisions provide a backdrop under which the DEQ's underground storage tank site remediation and closure laws must adhere too. Those relevant constitutional provisions include:

Preamble: We the people of Montana grateful to God for the quiet beauty of our state, the grandeur of our mountains, the vastness of our rolling plains, and desiring to improve the quality of life, equality of opportunity and to secure the blessings of liberty for this and future generations do ordain and establish this constitution.

Article II, Section 3. Inalienable rights. All persons are born free and have certain inalienable rights. They include *the right to a clean and healthful environment* and the rights of pursuing life's basic necessities, enjoying and defending their lives and liberties, acquiring, possessing and protecting property, and seeking their safety, *health* and happiness in all lawful ways. In enjoying these rights, all persons recognize corresponding responsibilities.

Article IX, Section 1. Protection and improvement. (1) The state and each person shall maintain and improve a clean and healthful environment in Montana for present and future generations.
(2) The legislature shall provide for the administration and enforcement of this duty.
(3) The legislature shall provide adequate remedies for the protection of the environmental life support system from degradation and provide adequate remedies to prevent unreasonable depletion and degradation of natural resources.

The Montana Supreme Court has defined the fundamental right to a clean and healthful environment that can be paraphrased as follows:

> The constitutional right to a clean and healthful environment includes being free from unreasonable degradation (significant impact on the environment)...and this right is anticipatory and preventative in nature. This right must be read and interpreted in conjunction with Article IX, Section I; Article II, Section 3; and the preamble of the Montana Constitution.[1]

[1] MEIC v. DEQ, 296 Mont. 207 (1999)

It is important to note that this right does not mean there cannot be any adverse change to the environment.

The Montana Supreme Court has also held that the environmental provisions of the Constitution apply not only to state actions but also private actions and therefore private parties.[2]

Each of the environmental regulatory statutes set out below, is specifically linked to the Montana environmental Constitutional provisions by the following language:

> The legislature, mindful of its constitutional obligations under Article II, section 3, and Article IX of the Montana constitution, has enacted this chapter. It is the legislature's intent that the requirements of this chapter provide adequate remedies for the protection of the environmental life support system from degradation and provide adequate remedies to prevent unreasonable depletion and degradation of natural resources.[3]

Montana Statutory Provisions

Underground Storage Tank Laws: The provisions of Title 75, chapter 11, provide for the installer licencing and permitting, tank clean-up and reimbursement, and tank leak reporting, inspections, remediation, and enforcement.

Water Quality Laws : The provisions of Title 75, chapter 5, provide regulatory guidance regarding prevention, abatement and control of the pollution of Montana waters.[4] Water quality laws govern only certain state waters. Specifically regulated are surface or underground bodies of water, irrigation systems, or drainage systems.[5]

Outside this regulatory realm are ponds or lagoons used solely for treating, transporting, or impounding pollutants; or irrigation or land application disposal waters used up within the system and not returned to state waters.[6] Montana water quality laws regulate every entity in the state, including individuals, businesses, organizations, and units of government.

Although any water use may cause an alteration, water quality laws regulate only certain uses. Regulated uses are those entailing potential pollution (either point source pollution or nonpoint

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[2] Cape- France Enterprises v. the Estate of Lola H. Peed, 2001 MT 139* (2001)

[3]See 75-5-102(1), 75-11-202 (1), 75-11-301 (1), 75-11-502(1), MCA

[4]Great liberty has been taken here in terms of lifting much of the explanation of the Water Quality Laws under this section literally verbatim from the EQC Water Quality Handbook (2008).

[5]75-5-103(29)(a), MCA

[6]75-5-103(29)(b), MCA

source pollution) to state waters: that is, activities that threaten water quality, human or wildlife health, or established beneficial uses.[7]

Under the authority of Montana's water quality laws in conjunction with the Federal Clean Water Act, state waters are classified, water quality standards are developed, and Montana's nondegradation laws are implemented. The Board of Environmental Review classifies all state surface water and ground water according to the beneficial uses supported by each water body/segment.[8] Given that the water quality issues surrounding underground storage tanks primarily involve ground water, an explanation of groundwater classification is necessary here.

Ground water classification involves four classes based on natural specific conductance: I, II, III, and IV.[9]

CLASS	BENEFICIAL USE	SPECIFIC CONDUCTANCE (microSiemens/cm at 25° C)
I	• Suitable for public and private water supplies, food processing, irrigation, etc., with little or no treatment required.	less than 1,000
II	• May be used for public and private water supplies where better quality water is not available. The primary use is for irrigation, stock water, and industrial purposes.	1,000-2,500
III	• Used primarily for stock water and industrial purposes.	2,500-15,000
IV	• Used primarily for industrial purposes.	greater than 15,000

The Board of Environmental Review is obligated to review classifications at least every 3 years and to revise them as needed.[10] Water classifications cannot be lowered unless the Board finds an original misclassification occurred.[11]

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[7]75-5-103(2), (24), and (25) and 80-15-102(11), MCA

[8]75-5-301(1), MCA

[9]ARM 17.30.1005 and 17.30.1006

[10]75-5-301(3), MCA

[11]75-5-302, MCA

Water quality standards specifying the maximum levels of alteration during use of state waters, are developed and adopted by the Board of Environmental Review. Water quality standard may either be numeric or narrative. There are exceptions with respect to water quality standards allowed under law that include temporary standards, short term authorizations, and mixing zones.

Of special interest here are short term authorizations that specifically to allow emergency remediation activities that have been approved, authorized, or required by the DEQ. In addition, Montana Water Quality Laws allow ground water mixing zones. Board of Environmental Review rules require these areas to have the smallest practicable size, a minimum effect on established beneficial uses, and definable boundaries.[12]

Montana contains an abundance of clean water. To protect these waters, the state adopted the nondegradation policy that applies to all new or increased discharges after April 1993. Under this policy, dischargers of pollutants are required to apply for an authorization to degrade and undergo a nondegradation review to evaluate the nature of the discharge in relation to the quality of the receiving waters.[13] Overall, this policy outlines three levels of water protection, stipulating what degradation, if any, is allowable in each level.

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[12]75-5-301(4), MCA

[13]75-5-303, MCA and Title 17, chapter 30, subchapter 7, ARM

Appendix E

CIRCULAR DEQ-7

MONTANA
NUMERIC WATER QUALITY STANDARDS

Montana Department of Environmental Quality
Planning, Prevention, and Assistance Division - Water Quality Standards Section
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CIRCULAR DEQ-7

Appendix E

Introduction

This document contains numeric water quality standards for Montana's surface and ground waters. The standards were developed in compliance with Section 75-5-301, MCA of the Montana Water Quality Act and Section 303(c) of the Federal Clean Water Act (CWA). Together, those provisions of state and federal law require the adoption of standards that will protect the designated beneficial uses of state waters, such as the support of aquatic life, public water supplies, recreation, or agriculture. The numeric water quality standards in this Circular have been established for parameters (i.e., "pollutants") that are categorized as toxic, carcinogenic, bioconcentrating, radioactive, nutrient, or harmful. In addition, the Circular contains ground water standards for pesticides developed in compliance with the Montana Agricultural Chemical Ground Water Protection Act (80-15-201, MCA).

Montana's numeric water quality standards were developed using guidance from the U.S. Environmental Protection Agency (EPA). EPA's guidance for water quality standards includes criteria for priority pollutants (PP) and non-priority pollutants (NPP) developed under Section 304 of the CWA, health advisories (HA), National Recommended Water Quality Criteria (NRWQC), and drinking water criteria referred to as Maximum Contaminant Levels (MCL). Publications containing EPA guidance include: 1986 Quality Criteria for Water, EPA 440/5/86-001 (the "Gold Book") and numerous updates; Toxics Criteria for those States not Complying with Clean Water Act 303(c)(2)(B); (The National Toxics Rule [NTR]) which was published in the Code of Federal Regulations, 40 CFR 131.36 (1992); Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; (62 F.R. 42159 [1997]); National Recommended Water Quality Criteria :2002 (EPA 822-R-02-047); and 2004 Edition of the Drinking Water Standards and Health Advisories (EPA 822-R-04-005). In general, the most recent EPA guidance was used to develop the standards in this Circular.

CIRCULAR DEQ-7 is regularly updated as additional information or guidance from EPA becomes available. Accordingly, readers should ensure that they are using the edition incorporated into the Board's current rules regarding water quality standards.

CIRCULAR DEQ-7 is a complex document. In addition to providing the numeric water quality standards for each parameter, the Circular also contains the primary synonyms of each parameter, the Chemical Abstracts Service Registry Number (CASRN) number for each chemical, the categorization of each parameter according to the type of pollutant, the bioconcentration factor if known, trigger values used to determine "significance" under Montana's nondegradation policy, and required reporting values. The Department will provide electronic copies of this document upon request or the document may be retrieved from the Department WEB site at, http://www.deq.mt.gov/wqinfo/Circulars/DEQ-7.PDF. Use of an electronic copy will enable the reader to search for synonyms or CASRN numbers. Such searches will make this document easier to use. Parameters are listed in alphabetical order. In order to facilitate listing by alphabetical order, parameters that are normally written with the numbers first are listed with the numbers last. For example, 2,4-Dinitrophenol is listed as Dinitrophenol, 2,4-.

There are many explanatory notes following the table portion of CIRCULAR DEQ-7. Footnotes referencing the explanatory notes are found in both the table headings and in individual line items. The notes following the table explain various aspects of the standards. For example, the standards for some metals, ammonia, dissolved oxygen, and phenol, cover a range of values that are computed by using a complex formula, or depend upon special circumstances.

Rules Containing Montana's Water Quality Standards

The Administrative Rules of Montana (ARM), 17.30.620 through 17.30.670, contain numeric surface water quality standards that vary with each stream classification. Examples of numeric standards that change under each stream classification include Eschierichia coli bacteria, color, turbidity, pH, and temperature. Montana's surface water rules also contain narrative standards. Narrative standards are also contained in Montana's rules for ground water (ARM 17.30.1001 through 17.30.1045). The narrative standards cover a number of parameters, such as alkalinity, chloride, hardness, sediment, sulfate, total dissolved solids and nutrients (for surface water), for which sufficient information does not exist to develop specific numeric standards.

Statutory Basis and Assumptions Used to Develop Water Quality Standards

Carcinogens: The Montana Water Quality Act requires that human health standards for carcinogens be the more restrictive of either of the following: (1) the risk-based level of one in one hundred thousand [1x10-5] for all carcinogens except arsenic, which is based upon one in one thousand [1x10-3]; or, (2) the MCL. For surface water the risk-based levels given in EPA's NRWQC criteria were used or, if not available, health advisory (HA) information was used. In cases where a risk-based level was not available, the most recent RfD or cancer potency factor (q1*) in IRIS was used to compute the standard. In cases where no risk-based levels were available for known carcinogens, the standards in this Circular are based on toxic effects. Ground water standards are based on EPA Drinking Water Health Advisories, NRWQC or IRIS information.

Bio-concentrating: The human health standards for carcinogens and other parameters that exhibit bio-concentration properties were developed using the assumption that there are two routes of exposure: through consumption of water and fish. EPA's water quality criteria are derived using an average fish consumption rate of 17.5 grams/day. Montana has not conducted its own fish consumption survey. The standards in this Circular use EPA's recommended average daily fish consumption value.

Pesticides: The Montana Agricultural Chemical Ground Water Protection Act requires that MCLs be adopted as ground water standards for pesticides if MCLs are available. If no MCLs or other federal criteria are available, standards must be developed using available data on health effects (reference dose, [RfD]) and standard assumptions. The standard assumptions used assume that 2 liters of water are consumed per day and adults weighing seventy kilograms are exposed for 70 years (life long exposure) to a single source of water. When information was available, a relative source contribution (RSC) factor was also applied. The RSC is the percentage of a parameter's intake through drinking water versus other dietary sources. A RSC of 0.2 was used in most cases to develop ground water standards for pesticides. In some cases, no data was available to develop a water quality standard for a pesticide in surface water. In these cases, the ground water standard (developed for a pesticide according to the risk-base analysis provided above) was also adopted as a surface water standard. The Integrated Risk Information System (IRIS) or other federal data sources were used when the EPA's most recent drinking water regulations and health advisories did not include data for a pesticide.

Toxins: The surfaee water quality standards for human health toxins are the more restrictive of the MCL or the NRWQC criteria. The ground water standards for human health toxins are based on the drinking water MCL or if a MCL is not available the NRWQC criteria.

Aquatic life: The standards for aquatic life are based on the most recent National Recommended Water Quality Criteria (NRWQC) published by EPA.

Appendix E

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)

Except where indicated, values are listed as micro-grams-per-liter (µg/L). A '—' indicates that a Standard has not been adopted or information is currently unavailable. A '()' indicates that a detailed note of explanation is provided.

Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Acenaphthene §§— § 3Acenaphthalene § Naphthyleneethylene § 1,8-Ethylenenaphthalene § 1,8-Ethylene Naphthalene § 1,2-Dihydroacenphthylene § Acenphthylene, 1,2-Dihydro-	83329 or 83-32-9 NIOSH: AB 1255500 SAX: AAE750	Toxic	—	—	242	670 PP	670 PP	N/A	10
Acifluorfen §§ Blazer § Tackle § Scepter § as sodium salt	62476-59-9	Carcinogen	—	—	—	10 HA	10 HA	N/A	—
Acrolein §§ Aqualine § Biocide § Crolean § Aqualin § Propenal § SHA 00701 § 2-propenal § Acraldehyde § Acrylaldehyde § Acrylic Aldehyde § Ethylene Aldehyde	107028 or 107-02-8 NIOSH: AS 1050000 SAX: ADR000	Carcinogen	—	—	215	190 PP	190 PP	0.7	20
Acrylamide §§ 2-Propenamide § Propenamide§ Acrylic Amide § Ethylenecarboxamide § RCRA Waste Number U007	79061 or 79-06-1 NIOSH: AS 3325000 SAX: ADS250	Carcinogen	—	—	—	0.08 HA	0.08 HA	—	—
Acrylonitrile §§ Fumigrain § Ventox § ENT 54 § TL 314 § Carbacryl § Cyanoethylene § Vinyl cyanide § Propenenitrile § 2-Propenenitrile § Acrylonitrile monomer § RCRA Waste Number U009	107131 or 107-13-1 also listed as 75-05-8 NIOSH: AT 5250000 SAX: ADX500 75-05-8	Carcinogen	—	—	30	0.51 PP	0.6 HA	N/A	20
Alachlor §§ Lasso § Lazo § Alator § Alanex § Alochlor § Pillarzo § Metachlor § Chimiclor § SHA 090501 § Methachlor § 2-Chloro-N-(2,6-Diethyl)Phenyl-N-Methoxymethylacetamide § 2-Chloro-2',6'-Diethyl-N-(Methoxymethyl)Acetanilide	15972608 or 15972-60-8 NIOSH: AE 1225000 SAX: CFX000	Carcinogen	—	—	—	2 MCL	2 MCL	N/A	0.4
Aldicarb §§ Temik § Temic § Ambush § OMS 771 § Temik G 10 § Aldecarb § Carbamyl § SHA 098301 § Carbanolate § Sulfone Aldoxycarb § Union Carbide 21149 § RCRA Waste Number P070 § Propanal, 2-Methyl-2-(Methylthio)-, O-[(Methylamino)Carbanyl]Oxime	116063 or 116-06-3 NIOSH: UE 2275000 SAX: CBM500	Toxic	—	—	—	3 MCL	3 MCL	1	1
Aldicarb Sulfone §§ Aldoxycarb § Standak § UC 21865 § Sulfocarb § SHA 110801 § Propionaldehyde, 2-Methyl-2-(Methylsulfonyl)-, O-(Methylcarbomoyl)Oxime § 2-Methyl-2-(Methylsulfonyl)Propanal O-[(Methylamino)Carbonyl]Oxime	1646884 or 1646-88-4 NIOSH: UE 2080000 SAX: AFK000	Toxic	—	—	—	3 MCL	3 MCL	2	1
Aldicarb Sulfoxide §§ —	1646873 or 1646-87-3 NIOSH: — SAX: —	Toxic	—	—	—	4 MCL	4 MCL	2	1

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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Aldrin §§ — § HHDN § Altox § Drinox § Aldrex § Aldrite § Seedrin § Octalene § SHA 045101 § RCRA Waste Number P004 § Hexachlorohexahydro-endo-exo-Dimethanonaphthalene § 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8, 8a-Hexahydro-1,4,5,8-Dimethanonaphthalene § 1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-Hexahydro-endo,exo- § 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-Hexa-Hydro-1,4:5,8-Endo,Exo-Dimethanonaphthalene § 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-Hexahydro-1,4-endo-exo-5,8-Dimethanonaphthalene	309002 or 309-00-2 NIOSH: IO 2100000 SAX: AFK250	Carcinogen	1.5 PP	—	4,670	0.00049 PP	0.02 HA	N/A	0.2
Alpha Emitters (11) §§ — § Gross Alpha § Adjusted Gross Alpha	Multiple	Carcinogen / Radioactive	—	—	—	15 pico-curies/liter HA	15 pico-curies/liter HA	N/A	—
alpha-Chlordane §§ -Chlordane § cis-Chlordan § cis-Chlordane § c (cis)-Chlordane § Chlordane, cis-Isomer	5103719 or 5103-71-9 NIOSH: PB 9705000 SAX: CDR675	Carcinogen	—	—	14,100	0.0080 PP	1 HA	N/A	0.4
alpha-Hexachlorocyclohexane §§ — § Benzene Hexachloride-§-isomer § a-BHC § alpha-BHC § HCH-alpha § alpha-HCH § alpha-Lindane § a Hexachloracyclohexane § alpha-Benzenehexachloride § Hexachlorocyclohexane-alpha § alpha-Hexachlorocyclohexane § Benzene Hexachloride-alpha-isomer § alpha-1,2,3,4,5,6-Hexachlorocyclohexane § Cyclohexane, alpha-1,2,3,4,5,6-Hexachloro- § 1-alpha,2-alpha,3-beta,4-alpha,5-beta,6-beta-Hexachlorocyclohexane § Cyclohexane, alpha-1,2,3,4,5,6-Hexachloro-, (1-alpha, 2-alpha, 3-beta, 4-alpha, 5-beta, 6-beta)-	319846 or 319-84-6 NIOSH: GV 3500000 SAX: BBQ000	Carcinogen	—	—	130	0.026 PP	0.026 PP	N/A	0.1
Aluminum, dissolved, pH 6.5 to 9.0 only (9) §§ Al	7429905 or 7429-90-5 NIOSH: BD 0330000 SAX: AGX000	Toxic	750 NPP	87 NPP	—	—	—	30	30
Ametryn §§ Ametrex	834-12-8	Toxic	—	—	—	60 HA	60 HA	—	—
Ammonia [total ammonia nitrogen (NH3-N plus NH4-N)] as mg/l N §§ — § Ammonia Anhydrous § Anhydrous Ammonia § Spirit of Hartshorn	7664417 or 7664-41-7 NIOSH: BO 0875000 SAX: AMY500	Toxic	(7)(8) NPP	(7)(8) NPP	—	—	—	10	50
Ammonium Sulfamate §§ ---	7773-06-0	Toxic	—	—	—	2,000 HA	2,000 HA	—	—
Anthracene (PAH) §§ Paranaphthalene § Green Oil § Anthracin § Tetra Olive N2G	120127 or 120-12-7 NIOSH: CA 9350000 SAX: APG500	Toxic	—	—	30	8,300 PP	2,100 HA	0.04	0.2

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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Triggar Value (22)	Requirad Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Antimony §§ Sb § Antimony Black § Antimony Regulus § C.I. 77050 § Stibium	7440360 or 7440-36-0 NIOSH: CC 4025000 SAX: AQB750	Toxic	—	—	1	5.6 PP	6 MCL	0.4	3
Arsenic §§ As § Arsenicals § Arsenic-75 § Arsenic Black § Colloidal Arsenic § Grey Arsenic § Metallic Arsenic	7440382 or 7440-38-2 NIOSH: CG 0525000 SAX: ARA750	Carcinogen	340 PP	150 PP	44	see footnote 29	see footnote 29	N/A	3
Asbestos, fibers longer than 10 microns in length §§ — § Amianthus § Amosite (Obs.) § Amphibole § Asbestos Fiber § Fibrous Grunerite § NCI C08991 § Serpentine, includes Chrysotile, Actinolite, Aurosite, Anthophyllite, Crocidolite, and Tremolite	Multiple	Carcinogen	—	—	—	7,000,000 fibers/liter MCL	7,000,000 fibers/liter MCL	N/A	—
Atrazine §§ — § Aatrex § Aktikon § Atrasine § Atred § Candex § Crisatrina § Crisazine § Cyazin § Fenamin § Fenamine § Zeaphos § Fenatrol § Gesaprim § Hungazin § Inakor § Primotol § Malermais § Radazin § Radizine § Shell Atrazine herbicide § Strazine § Zeazine § SHA 080803 § 1-Chloro-3-Ethylamino-5-Isopropylamino-2,4,6-Triazine § s-Triazine, 2-Chloro-4-Ethylamino-6-Isopropylamino- § 2-Chloro-4-Ethylamino-6-Isopropylamino-s-Triazine § 6-Chloro-N-Ethyl-N'-(1-Methylethyl)-1,3,5-Triazine-2, 4-Diamine	1912249 or 1912-24-9 NIOSH: XY 5600000 SAX: PMC325	Carcinogen	—	—	—	3 MCL	3 MCL	0.1	0.6
Barium §§ Ba	7440393 or 7440-39-3 NIOSH: CA 8370000 SAX: BAH250	Toxic	— NPP	— NPP	—	2,000 MCL	2,000 MCL	2	5
Bentazon Methyl §§ — § Basagran	50723-80-3 25057-89-0	Toxic	—	—	—	200 HA	200 HA	—	—
Benzene §§ — § Phene § Benzol § Benzolene § Pyrobenzol § Carbon Oil § SHA 109301 § Coal Naphtha § Mntor Benzol § Phenyl hydride § Cyclohexatriene C § Caswell Number 077 § RCRA Waste Number U019 § EPA Pesticide Chemical Code 008801 § NCI C55276	71432 or 71-43-2 NIOSH: CY 1400000 SAX: BBL250	Carcinogen	—	—	5.2	5 MCL	5 MCL	N/A	0.5
Benzidine §§ — § p,p'-Bianiline § 4,4'-Biauiline § 4,4'-Biphenyldiamine § p,p'-Diaminohiphenyl § 4,4'-Diaminodiphenyl § RCRA Waste Number U021 § 4,4'-Biphenylenediamine § 4,4'-Diphenylenediamine § Biphenyl, 4,4'-Diamino- § 4,4'-Diamino-1,1'-Biphenyl § (1,1'-Biphenyl)-4,4'-Diamine § NCI C03361	92875 or 92-87-5 NIOSH: DC 9625000 SAX: BBX000	Carcinogen	—	—	87.5	0.00086 PP	0.00086 PP	N/A	20

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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Benzo(g,h,i)perylene (PAH) § 1,12-Benzoperylene § 1,12-Benzperylene § Benzo(ghi)Perylene	191242 or 191-24-2 NIOSH: DI 6200500 SAX: BCR000	Toxic	—	—	30	—	—	0.076	10
Benzo[a]Pyrene (PAH) §§ — § BaP § 3,4-BP § Benz(a)Pyrene § Benzo-a-Pyrene § 3,4-Benzpyrene § 6,7-Benzopyrene § 3,4-Benzopyrene § 3,4-Benz(a)Pyrene § Benzo(d,e,f)Chrysene	50328 or 50-32-8 NIOSH: DJ 3675000 SAX: BCS750	Carcinogen	—	—	30	0.038 PP	0.05 HA	N/A	0.10
Benzo[b]Fluoranthene (PAH) §§ — § B(b)F § Benzo(b)Fluoranthene § Benzo(e)Fluoranthene § 2,3-Benzfluoranthene § 3,4-Benzfluoranthene § 3,4-Benzofluoranthene § 2,3-Benzofluoranthene § 2,3-Benzofluoranthrene § Benz(e)Acephenanthrylene § 3,4-Benz(e)Acephenanthrylene	205992 or 205-99-2 NIOSH: CU 1400000 SAX: BAW250	Carcinogen	—	—	30	0.038 PP	0.5 (30) HA	N/A	0.10
Benzo[k]Fluoranthene (PAH) §§ — § Benzo(k)Fluoranthene § 8,9-Benzofluoranthene § Dibenzo(b,jk)Fluorene § 2,3,1'8'-Binaphthylene § 11,12-Benzofluoranthene § 11,12-Benzo(k)Fluoranthene	207089 or 207-08-9 NIOSH: DF 6350000 SAX: BCJ750	Carcinogen	—	—	30	0.038 PP	5 (30) HA	N/A	0.10
Benz[a]anthracene (PAH) §§ — § Tetraphene § Benzanthracene § Benzoanthracene § Naphthanthracene § 1,2-Benzanthrene § Benz(a)Anthracene § Benzo(a)Anthracene § 1,2-Benzanthracene § Benzo(h)Phenanthrene § 1,2-Benzoanthracene § Benzanthracene, 1,2- § 1,2-Benz(a)Anthracene § 2,3-Benzophenanthrene § RCRA Waste Number U018	56553 or 56-55-3 NIOSH: CV 9275000 SAX: BBC250	Carcinogen	—	—	30	0.038 PP	0.5 (30) HA	N/A	0.10
Beryllium §§ Be § Beryllium-9 § Glucinum § RCRA Waste Number P015	7440417 or 7440-41-7 NIOSH: DS 1750000 SAX: BEO750	Carcinogen	—	—	19	4 MCL	4 MCL	N/A	1
Beta Emitters (11) §§ — § Gross Beta	Multiple	Carcinogen/ Radioactive	—	—	—	0.4 mrem /yr HA	0.4 mrem /yr HA	N/A	—
Beta-Chloronaphthalene §§ 2-Chloronaphthalene § 0-Chloronaphthalene § Naphthalene, 2-Chloro- § RCRA Waste Number U047	91587 or 91-58-7 NIOSH: QJ 2275000 SAX: CJA000	Toxic	—	—	202	1,000 PP	1,000 PP	0.94	10

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)

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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
beta-Hexachlorocyclohexane §§ — § ß-BHC § beta-BHC § HCH-beta § beta-HCH § ß-Lindane § beta-Lindane § beta-Hexachlorobenzene § ß Hexachloracyclohexane § Hexachlorocyclohexane-beta § Hexachlorocyclohexane, beta- § trans-alpha-Benzenehexachloride § Cyclohexane, 1,2,3,4,5,6-Hexachloro-, beta- § 1-alpha,2-beta,3-alpha,4-beta,5-alpha,6-beta-Hexachlorncyclohexane § Cyclohexane, 1,2,3,4,5,6-Hexachloro-, (1-alpha, 2-beta, 3-alpha, 4-beta, 5-alpha, 6-beta)- § Benzenehexachloride, trans-alpha- § beta-1,2,3,4,5,6-Hexachlorocyclohexane	319857 or 319-85-7 NIOSH: GV 4375000 SAX: BBR000	Carcinogen	—	—	130	0.091 PP	0.091 PP	N/A	0.1
Bis(2-Chloroisopropyl) Ether §§ — § DCIP § NCI C50044 § RCRA Waste Number U027 § Dichlorodiisopropyl Ether § 2,2'-Oxybis(1-Chloropropane) § Bis (2-Chloroisopropyl) ether § Propane, 2,2'-Oxybis(2-Chloro- § Propane, 2,2'-Oxybis[1-Chloro- § 2',2'-Dichlorodiisopropyl Ether § Dichlorodiisopropyl Ether (DOT) § Bis(2-Chloro-1-Methylethyl) Ether	108601 or 108-60-1 NIOSH: KN 1750000 SAX: BII250 39638-32-9	Toxic	—	—	2.47	1,400 PP	1,400 PP	0.8	10
Bis(2-Chloroethoxy)Methane §§ — § Bis(ß-Chloroethyl)Formal	111911 or 111-91-1 NIOSH: PA 3675000 SAX: BID750	Toxic	—	—	0.64	—	—	0.5	—
Bis(Chloromethyl)Ether §§ — § BCEE § DCEE § Clorex § Chlorex § Chloroethyl Ether § Dichloroethyl Ether § Dichloroethyl Oxide § RCRA Waste Number U025 § Bis(Chloroethyl) Ether § Di(2-Chloroethyl) Ether § Bis (Chloroethyl) Ether § Bis(2-Chloroethyl) Ether § Bis(ß-Chloroethyl) Ether § ß,ß'-Dichloroethyl Ether § 2,2'-Dichloroethyl Ether § Bis (2-Chloroethyl) Ether § 1,1'-Oxybis(2-Chloro)Ethane § Ethane, 1,1'-Oxybis[2-Chloro- § beta,beta'-Dichloroethyl Ether § 1-Chloro-2-(beta-Chloroethoxy)Ethane	111444 or 111-44-4 NIOSH: KN 0875000 SAX: BIC750	Carcinogen	—	—	6.9	0.30 PP	0.30 PP	N/A	10
Bis(Chloromethyl)Ether §§ — § BCME § bis-CME § Chloromethyl Ether § Oxybis(Chloromethane) § RCRA Waste Number P016 § Bis (Chloromethyl) Ether § sym-Dichlorodimethyl Ether § 1,1'-Dichlorodimethyl Ether § Dimethyl-1,1'-Dichloroether § Chloro(Chloromethoxy) Methane	542881 or 542-88-1 NIOSH: 1575000 SAX: BIK000	Carcinogen	—	—	63	0.0010 NPP	0.0010 NPP	N/A	10
Bromacil §§ Hyvar § —	314-40-9	Carcinogen	—	—	—	90 HA	90 HA	N/A	0.5
Bromodichloromethane (HM) §§ Dichlarobromomethane § BDCM § NCI C55243 § Methane, bramodichloro- § Dichloramonabromomethane § Monobromodichlaromethane	75274 or 75-27-4 NIOSH: PA 5310000 SAX: BND500	Carcinogen	—	—	3.75	5.5 PP	10 HA	N/A	0.5

Appendix E

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)

Except where indicated, values are listed as micro-grams-per-liter (µg/L). A '—' indicates that a Standard has not been adopted or information is currently unavailable. A '( )' indicates that a detailed note of explanation is provided.

Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Bromoform (HM) §§ Trihrommmethane § NCI C55130 § Methane, Tribromo- § Methenyl Tribromide § RCRA Waste Number U225	75252 or 75-25-2 NIOSH: PB 5600000 SAX: BNL000	Carcinogen	—	—	3.75	43 PP	80 HA	N/A	0.5
Bromomethane (HM) §§ Methyl Bromide § EDCO § Celfume § Dowfume § Methogas § SHA 053201 § Brom-O-Sol § Brom-O-Gas § Terr-O-Gas § Halon 1001 § Terr-O-Cide § Bromo-O-Gas § Bromo Methane § Methylhromide § Methyl Bromide § Methane, Bromo- § Monobromomethane § RCRA Waste Number U029	74839 or 74-83-9 NIOSH: PA 4900000 SAX: BNM500	Toxic	—	—	3.75	47 PP	10 HA	0.11	0.5
Bromoxynil	1689-84-9	Carcinogen	—	—	—	3.4 HA	3.4 HA	—	—
Butyl Benzyl Phthalate §§ — § BBP § Sienl 160 § Unimoll BB § Palatinol BB § Santicizer 160 § Butylbenzylphthalate § Butylbenzyl Phthalate § Benzyl Butyl Phthalate § n-Benzyl Butyl Phthalate § Benzyl n-Butyl Phthalate § Phthalic Acid, Benzyl Butyl Ester § Butyl Phenylmethyl 1,2-Benzenedicarboxylate § 1,2-Benzenedicarbnxylic Acid, Butyl Phenylmethyl	85687 or 85-68-7 NIOSH: TH 9990000 SAX: BEC500	Toxic with BCF >300	—	—	414	1,500 PP	1,500 PP	N/A	10
Butylate §§ Sutan § —	2008-41-5	Carcinogen	—	—	—	400 HA	400 HA	N/A	—
Cadmium §§ Cd § C.I. 77180 § Colloidal Cadmium	7440439 or 7440-43-9 NIOSH: EU 9800000 SAX: CAD000	Toxic	0.52/@25 mg/l hardness (12) PP	0.097/@25 mg/l hardness (12) PP	64	5 MCL	5 MCL	0.1	0.08
Carbaryl §§ Sevin § —	63-25-2	Toxic	—	—	—	700 HA	700 HA	2	—
Carbofuran §§ — § Yaltox § Euradan § Furadan § Curaterr § Furacarb § SHA 090601 § Niagra 10242 § 2,2-Dimethyl-7-Coumaranyl N-Methylcarbamate § 2,2-Dimethyl-2,3-Dihydro-7-Benzofuranyl N-Methylcarbamate § Carbamic Acid, Methyl-, 2,3-Dihydro-2,2-Dimethyl-7-Benzofuranyl Ester	1563662 or 1563-66-2 NIOSH: FB 9450000 SAX: FPE000	Toxic	—	—	—	40 MCL	40 MCL	1	1
Carbon Tetrachloride §§ Freon 10 § R 10 § Univerm § Tetrasol § Fasciolin § Flukoids § Necatorina § Necatorine § Halon 104 § Tetrafnrm § Carbon Tet § Benzinoform § Carbon Chloride § Perchloromethane § Tetrachloromethane § Methane Tetrachloroide § RCRA Waste Number U211	56235 or 56-23-5 NIOSH: FG 4900000 SAX: CBY000	Carcinogen	—	—	18.75	2.3 PP	3 HA	N/A	0.5

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)

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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Carboxin §§ Vitavax § —	5234-68-4	Toxic	—	—	—	700 HA	700 HA	1	—
Chloramben §§ Vegiben § —	133-90-4	Toxic	—	—	—	100 HA	100 HA	—	—
Chlordane §§ Termex § Belt § Niran § Dowchlor § Chlortox § Chlordan § Clordano § Chlor Kil § Toxichlor § Octa-Klor § Ortho-Klor § SHA 058201 § Gold Crest C-100 § Chlordane, Technical § RCRA Waste Number U036 § Octachloro-4, 7-Methanohydroindane § Octachlorodihydrodicyclopentadiene § 1,2,4,5,6,7,8,8-Octachloro-3a,4,7,7a-Hexahydro § Octachloro-4,7-Methanotetrahydroindane-4,7-Methylene Indane § 4,7-Methanoindan, 1,2,4,5,6,7,8,8-Octachloro-3a,4,7,7a-tetrahydrn- § 1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-Hexahydro-4,7-Methano-Indene § 4,7-Methano-1H-Indene 1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-Hexahydro-	57749 or 57-74-9 NIOSH: PB 9800000 SAX: CDR750	Carcinogen	2.4 PP	0.0043 PP	14,100	0.0080 PP	1 HA	N/A	0.4
Chlorimuron Ethyl §§ Classic § —	90982-32-4	Toxic	—	—	—	700 HA	700 HA	0.1	—
Chlorine, total residual §§ Cl § Bertholite § Chlorine, molecular § Molecular Chlorine	7782505 or 7782-50-5 NIOSH: FO 2100000 SAX: CDV750	Toxic	19 NPP	11 NPP	—	4,000 MCL	4,000 MCL	—	—
Chlorobenzene §§ Monochlorobenzene § MCB § Chlorobenzol § Chlorbenzene § Phenyl Chloride § Benzene Chloride § Benzene, Chloro- § Monochlorbenzene § RCRA Waste Number U037 § NCI C54886	108907 or 108-90-7 NIOSH: CZ 0175000 SAX: BBM750	Toxic	—	—	10.3	100 MCL	100 MCL	0.5	0.5
Chloroethane §§ Ethyl Chloride § Aethylis § Aethylis Chloridum § Anodynon § Chelen § Chlorethyl § Chloridum § Chloryl § Chloryl Anesthetic § Ether Chloratus § Ether Hydrochloric § Ether Muriatic § Hydrochloric Ether § Kelene § Monochlorethane § Muriatic Ether § Narcotile § NCI C06224	75003 or 75-00-3 NIOSH: KH 7525000 SAX: EHH000	Toxic	—	—	—	—	—	0.52	—
Chloroform (HM) §§ Trichloromethane § TCM § Freon 20 § Trichloroform § R-20 Refrigerant § Methenyl Chloride § Formyl Trichloride § Methyl Trichloride § Methane Trichloride § Methane, Trichloro- § Methenyl Trichloride § RCRA Waste Number U044 § NCI CO2686	67663 or 67-66-3 NIOSH: FS 9100000 SAX: CHJ500	Carcinogen	—	—	3.75	57 PP	70 HA	N/A	0.5
Chlorophenol, 2- §§ Phenol, 2-Chloro § o-Chlorophenol § 2-Chlorophenol § Phenol, o-Chloro- § RCRA Waste Number U048	95578 or 95-57-8 NIOSH: SK 2625000 SAX: CJK250	Toxic	—	—	134	81 PP	81 PP	0.3	10

Appendix E

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)									
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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Chlorophenyl Phenyl Ether, 4- §§ — § 4- Chlorophenyl Phenyl Ether	7005723 or 7005-72-3 NIOSH: — SAX: —	Toxic with BCF >300	—	—	1,200	—	—	—	—
Chlorsulfuron §§ Glean §§ Telar	64902-72-3	Toxic	—	—	—	1750 HA	1750 HA	—	—
Chlorothalonil §§ Bravo § —	1897-45-6	Carcinogen	—	—	—	15 HA	15 HA	N/A	—
Chlorpyrifos §§ Dursban § Ethion § Brodan § Eradex § Lorsban § Pyrinex § NA 2783 § Piridane § DowCo 179 § SHA 059101 § Ethion, dry § Chlorothalonil § Chlorpyrifos-Ethyl § O,O-Diethyl O-3,5,6-Trichloro-2-Pyridyl Phosphorothioate § Phosphorothioic Acid, O,O-Diethyl O-(3,5,6-Trichloro-2-Pyridyl) Ester	2921882 or 2921-88-2 NIOSH: TF 6300000 SAX: DYE000	Toxic	0.083 NPP	0.041 NPP	—	20 HA	20 HA	0.25	1
Chromium, all forms §§ Cr § Chrome	7440473 or 7440-47-3 NIOSH: GB 4200000 SAX: CMI750	Toxic	—	—	—	100 MCL	100 MCL	1	1
Chromium, hexavalent §§ Chromium (VI) § —	18540299 or 18540-29-9 NIOSH: — SAX: —	Toxic	16 PP	11 PP	16	—	—	—	5
Chromium, trivalent §§ Chromium (III) § —	16065831 or 16065-83-1 NIOSH: — SAX: —	Toxic	579/@ 25mg/l hardness(12) PP	27.7 @ 25 mg/l hardness (12) PP	16	—	—	1	—
Chrysene (PAH) §§ — § Benz(a)Phenanthrene § Benzo(a)Phenanthrene § 1,2-Benzphenanthrene § 1,2-Benzophenanthrene § RCRA Waste Number U050 § 1,2,5,6-Dibenzonaphthalene	218019 or 218-01-9 NIOSH: GC0700000 SAX: CML810	Carcinogen	—	—	30	0.038 PP	50 (30) HA	N/A	0.10
cis-1,2-Dichloroethylene §§ — § 1,2-Dichloroethylene § cis-Dichloroethylene § cis-1,2-Dichloroethene § 1,2,cis-Dichloroethylene § ethylene, 1,2-Dichloro-, (z)-	156592 or 156-59-2 NIOSH: KV 9420000 SAX: DFI200	Toxic	—	—	—	70 MCL	70 MCL	0.002	0.5
cis-1,3-Dichloropropene §§ Telone II § 1,3-Dichloropropene § 1,3-Dichloropropylene § (Z)-1,3-Dichloropropene § cis-1,3-Dichloropropylene § 1-Propene, 1,3-Dichloro-, (Z)-	10061015 or 10061-01-5 NIOSH: UC 8325000 SAX: DGH200	Carcinogen	—	—	1.91	3.4 PP	4 HA	N/A	0.5
Clopyralid §§ Stinger § —	1702-17-6	Toxic	—	—	—	3,500 1	3,500 1	1	—

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)

Except where indicated, values are listed as micro-grams-per-liter (µg/L). A '---' indicates that a Standard has not been adopted or information is currently unavailable. A '( )' indicates that a detailed note of explanation is provided.

Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Color §§ —	N/A	Harmful	—	—	—	(18)	(18)	—	5 UNITS
Copper §§ Cu § Allbri Natural Copper § ANAC 110 § Arwood Copper § Bronze Powder § CDA 101 § CDA 102 § CDA 110 § CDA 122 § C.I. 77400 § C.I. Pigment Metal 2 § Copper Bronze § 1721 Gold § Gold Bronze § Kafar Copper § M1 (Copper) § M2 (Copper) § OFHC Cu § Raney Copper	7440508 or 7440-50-8 NIOSH: GL 5325000 SAX: CN1000	Toxic	3.79@25mg/l hardness(12) PP	2.85@25 mg/l hardness (12) PP	36	1,300 PP	1,300 PP	0.5	1
Cyanazine §§ Bladex § —	21725-46-2	Toxic	—	—	—	1.0 HA	1.0 HA	N/A	—
Cyanide, total §§ — § Cyanide § Isocyanide § RCRA Waste Number P030 § Cyanides, includes soluble salts and complexes	57125 or 57-12-5 NIOSH: GS 7175000 SAX: CO1500	Toxic	22 PP	5.2 PP	1	140 PP	200 MCL	—	5
Dacthal §§ DCPA § —	1861-32-1	Toxic	—	—	—	70 HA	70 HA	0.025	—
Dalapon §§ Revenge § Dalpon § Unipon § Dowpon § Radapon § Basinex § Ded-Weed § Dalacide § Gramevin § Crisapon § Dalpon Sodium § 2,2-Dichloropropionic Acid § SHA 28902, for sodium salt § SHA 28901, for dalapon only Propionic Acid, 2,2-Dichloro- § Sodium 2,2-Dichloropropionate § a-Dichloropropionic Acid § a,a-Dichloropropionic Acid § alpha-alpha-Dichloropropionic Acid	75990 or 75-99-0 NIOSH: UF 0690000 SAX: DG1400	Toxic	—	—	—	200 MCL	200 MCL	1.3	3
Dalapon, sodium salt §§ Dalpon § Unipon § Dowpon § Radapon § Revenge § Basinex § Ded-Weed § Dalacide § Gramevin § Crisapon § Dalpon Sodium § Sodium Dalapon § 2,2-Dichloropropionic Acid § SHA 28902, for sodium salt § SHA 28901, for dalapon only § Propionic Acid, 2,2-Dichloro- § Sodium 2,2-Dichloropropionate § alpha-alpha-Dichloropropionic Acid	127208 or 127-20-8 NIOSH: UF 1225000 SAX: DG1600	Toxic	—	—	—	200 MCL	200 MCL	1.3	3
delta-Hexachlorocyclohexane §§ — § -BHC § delta-BHC § HCH-delta § delta-HCH § -BHC § -Lindane § delta-Lindane § Hexachlorocyclohexane § delta-Benzenehexachloride § Hexachlorocyclohexane-delta § Hexachlorocyclohexane, delta- § Cyclohexane, delta-1,2,3,4,5,6-Hexachloro- § delta-1,2,3,4,5,6-Hexachlorocyclohexane § 1-alpha,2-alpha,3-alpha, 4-beta,5-alpha,6-beta-Hexachlorocyclohexane § Cyclohexane, delta-1,2,3,4,5,6-Hexachloro-, (1-alpha, 2-alpha, 3-alpha, 4-beta, 5-alpha, 6-beta)-	319868 or 319-86-8 NIOSH: GV 4550000 SAX: BF W500	Carcinogen	—	—	130	— PP	— PP	N/A	0.1

Appendix E

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)

Except where indicated, values are listed as micro-grams-per-liter (µg/L). A '—' indicates that a Standard has not been adopted or information is currently unavailable. A '( )' indicates that a detailed note of explanation is provided.

Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Demeton §§ Systox § Bay 10756 § Bayer 8169 § Demox § Diethoxy Thiophosphoric Acid Ester of 2-Ethylmercaptoethanol § O,O-Diethyl 2-Ethylmercaptoethyl Thiophosphate § O,O-Diethyl O(and S)-2-(Ethyl-Thio)Ethyl Phosphorothioate Mixture § E 1059 § ENT 17,295 § Mercaptophos § Systemox § Systox § ULV § Demeton-O + Demeton-S	8065483 or 8065-48-3 NIOSH: TF 3150000 SAX: DAO600	Toxic	—	0.1 NPP	—	1.4 HA	1.4 HA	0.25	—
Di(2-Ethylhexyl)Phthalate (PAE) §§ Bis(2-Ethylhexyl)Phthalate § BEHP § DEHP § Octoil § Fleximel § Flexol DOP § Kodaflex DOP § Ethylhexyl Phthalate § Diethylhexyl Phthalate § 2-Ethylhexyl Phthalate § Di(Ethylhexyl)phthalate § Di(2-Ethylhexyl)phthalate § Bis (2-Ethylhexyl) Phthalate § Bis(2-Ethylhexyl)-1,2-Benzene-Dicarboxylate § 1,2-Benzenedicarboxylic Acid, Bis(2-Ethylhexyl)Ester	117817 or 117-81-7 NIOSH: TI 0350000 SAX: BJS000	Carcinogen	—	—	130	6 MCL	6 MCL	---	6
Di(2-Ethylhexyl)Adipate §§ Hexanedioic Acid § DEHA § BEHA § Bisoflex DOA § Effemoll DOA § Ergoplast AdDO § Flexol A 26 § PX-238 § Reomol DOA § Vestinol OA § Wickenol 158 § Kodaflex DOA § Monoplex DOA § NCI C54386 § Octyl Adipate § Dioctyl Adipate § Di-2-Ethylhexyl Adipate § Di (2-Ethylhexyl) Adipate § Bis(2-Ethylhexyl) Adipate § Adipic Acid, Bis(2-Ethylhexyl) Ester § Hexanedioic Acid, Bis(2-Ethylhexyl) Ester	103231 or 103-23-1 NIOSH: AU 9700000 SAX: AEO000	Carcinogen	—	—	—	300 HA	300 HA	N/A	6
Diazinon §§ —	333-41-5	Toxic	—	—	—	0.6 HA	0.6 HA	0.25	—
Dibenz[a,h]Anthracene (PAH) §§ — § DBA § DB(a,h)A § Dibenz(a,h)Anthracene § RCRA Waste Number U063 § Dibenzo(a,h)anthracene § 1,2:5,6-Benzanthracene § Dibenzo (a,h) Anthracene § 1,2,5,6-Dibenzanthracene § 1,2:5,6-Dibenz(a)Anthracene	53703 or 53-70-3 NIOSH: HN 2625000 SAX: DCT400	Carcinogen	—	—	30	0.038 PP	0.05 (30) HA	N/A	0.10
Dibromochloromethane (THM) §§ Monochlorodibromomethane § CDBM § NCI C55254 § Chlorodibromomethane § Methane, Dibromochloro-	124481 or 124-48-1 NIOSH: PA 6360000 SAX: CFK500	Carcinogen	—	—	3.75	4.0 PP	4.0 PP	N/A	0.5
Dibromoethane, 1,2- §§ Ethylene Dibromide § DBE § EDB § Nephis § Kopfume § Celmide § E-D-Bee § Soilfume § Bromofume § Dowfume 40 § SHA 042002 § Pestmaster § Soilbrom-40 § Dibromoethane § Ethylene Bromide § Glycol Dibromide § 1,2-Dibromoethane § 1,2-Ethylene Dibromide § RCRA Waste Number U067	106934 or 106-93-4 NIOSH: KH 9275000 SAX: EIY500	Carcinogen	—	—	—	0.004 HA	0.004 HA	N/A	0.5

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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Requirad Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Dibutyl Phthalate §§ — § DPB § Celluflex DPB § Elaol § Hexaplas M/B § Palatinol C§ Polycizer DBP § PX 104 § Staflex DBP § Witcizer § SHA 028001 § Butylphthalate § N-Butylphtbalate § Di-n-Butylphthalate § Di-n-Butylphthalate § Dihutyl-o-Phthalate § Di-n-Butyl Phthalate § RCRA Waste Number U069 § Phthalic Acid Dibutyl Ester § Dibutyl 1,2-Benzene Dicarboxylate § 1,2-Benzenedicarboxylic Acid Dihutyl Ester § 1,2-Benzenedicarboxylic Acid, Dibutyl Ester § Benzene-o-Dicarboxylic Acid Di-n-Butyl Ester	84742 or 84-74-2 NIOSH: TI 0875000 SAX: DEH200	Toxic	—	—	89	2,000 PP	2,000 PP	0.25	10
Dicamba §§ Banvel § —	1918-00-9	Toxic	—	—	—	200 HA	200 HA	0.28	—
Dichlorobenzene, 1,2- §§ DCB § ODB § ODCB § Dizene § Clnrohen § Chlorohen § Chloroden § Termitkil § Dilatin DB § Dowtherm E § Dilantin DB § o-Dichlorobenzene § Orthodichlorobenzene § ortho-Dichlorobenzene § Special Termite Fluid § Benzene, 1,2-Dichloro- § RCRA Waste Number U070	95501 or 95-50-1 NIOSH: CZ 4500000 SAX: DEP600	Toxic	—	—	55.6	420 PP	600 MCL	0.02	10
Dichlorobenzene, 1,3- §§ Benzene, 1,3-Dicbloro § M-Dichlnrobenzene § m-Dichlorobenzene § meta-Dichlorobenzene § 1,3-Dichlorobenzene-	541731 or 541-73-1 NIOSH: CZ 4499000 SAX: DEP699	Toxic	—	—	55.6	320 PP	600 HA	0.006	10
Dichlorobenzene, 1,4- §§ Benzene, 1,4-Dichloro- § 1,4- Dichlorobenzene § PDB § PDCB § NCI C54955 § Evola § Paradi § Paradow§ Persia-Perazol § Paracide § Parazene § Paramoth § Santochlor § Paranuggets § di-Chloricide § Para Chrystals § p-Dichlorobenzene § Caswell Number 632 § Paradichlorobenzene § para-Dichlorobenzene- § RCRA Waste Number U070 § RCRA Waste Number U071 § RCRA Waste Number U072 § p-Chlorophenyl Chloride § EPA Pesticide Chemical Code 061501	106467 or 106-46-7 NIOSH: CZ 4550000 SAX: DEP800	Carcinogen	—	—	55.6	75 MCL	75 MCL	N/A	10
Dichlorobenzidine, 3,3'- §§ DCB § C.I. 23060 § Curithane C126 § Dichlorobenzidine § o,o'-Dichlorobenzidine § Dichlorobenzidine Base § Benzidine, 3,3'-Dichloro- § RCRA Waste Number U073 § 3,3'-Dichloro-4,4'-Diaminodiphenyl § 3,3'-Dichloro-(1,1'-Biphenyl)-4,4'-Diamine § 1,1'-Biphenyl-4,4'-Diamine, 3,3'-Dichloro-	91941 or 91-94-1 NIOSH: DD 0524000 SAX: DEQ400	Carcinogen	—	—	312	0.21 PP	0.21 PP	N/A	20
Dichlorodifluoromethane (HM) §§ Freon 12 § F 12 § R 12 § FC 12 § Halon § CFC-12 § Areton 6 § Electro-CF 12 § Eskimon 12 § Frigen 12 § Gentron 12 § Isceon 122 § Kaiser Chemicals 12 § Ledon 12 § Ucon 12 § Propellant 12 § Refrigerant 12 § Fluorcarbon-12 § RCRA Waste Number U075 § Difluorodichloromethane § Methane, dichlorodifluoro-	75718 or 75-71-8 NIOSH: PA 8200000 SAX: DFA600	Toxic	—	—	3.75	1,000 HA	1,000 HA	0.05	0.5

Appendix E

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)

Except where indicated, values are listed as micro-grams-per-liter (µg/L). A '—' indicates that a Standard has not been adopted or information is currently unavailable. A '( )' indicates that a detailed note of explanation is provided.

Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Dichloroethane, 1,2- §§ Ethylene Chloride § EDC § Brocide § 1,2-DCE § NCI C00511 § Dutch Oil § Dutch Liquid § Dichloremulsion § Di-Chlor-Mulsion § 1,2-Bichloroethane § 1,2-Dichlorethane § Ethane Dichloride § 1,2-Bichloroethane § Ethylene Dichloride § 1,2-Dichloroethane § Ethane, 1,2-Dichloro- § RCRA Waste Number U077§ 1,2-Ethylene Dichloride § alpha,beta-Dichloroethane	107062 or 107-06-2 NIOSH: KI 0525000 SAX: DFF900	Carcinogen	—	—	1.2	3.8 PP	4 HA	N/A	0.5
Dichloroethene, 1,1- §§ Vinylidene Chloride § VDC § 1,1-DCE § Sconatex § NCI C54262 § 1,1-Dichloroethene § Vinylidene Chloride § 1,1-Dichloroethylene § Vinylidene Dichloride § Ethene, 1,1-Dichloro- § Vinylidene Chloride H § RCRA Waste Number U078 § Dichloroethylene, 1,1- § Ethylene, 1,1-Dichloro-	75354 or 75-35-4 NIOSH: KV 9275000 SAX: DFI000	Carcinogen	—	—	5.6	0.57 PP	0.6 HA	N/A	0.5
Dichloromethane (DM) §§ Methylene Chloride § R 30 § DCM § Freon 30 § Aerothene MM § NCI C50102 § Solmethine § Methylene Chloride § Methane Dichloride § Methane, Dichloro- § 1,1-Dichloromethane § Methylene Bichloride § Methylene Dichloride	75092 or 75-09-2 NIOSH: PA 8050000 SAX: MDR000	Carcinogen	—	—	0.9	5 MCL	5 MCL	N/A	0.5
Dichlorophenol, 2,4- §§ Phenol, 2,4-Dichloro § DCP § 2,4-DCP § NCI C55345 § 2,4-Dichlorophenol § RCRA Waste Number U081	120832 or 120-83-2 NIOSH: SK 8575000 SAX: DFX800	Toxic	—	—	40.7	77 PP	77 PP	10	10
Dichlorophenoxyacetic Acid, 2,4- §§ Dichlorophenoxyacetic Acid § 2,4-D § Salvo § Phenox § Farmco § Amidox § Miracle § Agrotect § Weedtrol § Herbidal § Ded-Weed § Lawn-Keep § Fernimine § Crop Rider § Aqua-Kleen § 2,4-Dichlorophenoxy Acetic Acid § Dichlorophenoxyacetic Acid, 2,4- § Acetic Acid, (2,4-Dichlorophenoxy)- § 2,4-Dichlorophenoxyacetic Acid, salts and esters	94757 or 94-75-7 NIOSH: AG 6825000 SAX: DFY600	Toxic	—	—	—	70 MCL	70 MCL	0.02 N/A	1
Dichloropropane, 1,2- §§ Propylene Chloride § 1,2-Dichloropropane § NCI C55141 § Propylene Dichloride § Caswell Number 324 § Propane, 1,2-Dichloro- § a,ß-Propylene Dichloride § alpha,beta-Dichloropropane § RCRA Waste Number U083 § EPA Pesticide Chemical Code 029002	78875 or 78-87-5 NIOSH: TX 9625000 SAX: DGF600	Carcinogen	—	—	4.11	5.0 PP	5 MCL		0.5
Dichloropropene, 1,3- §§ Telone II § Telone § NCI C03985 § Vidden D § Dichloropropene § a-Chloroallyl Chloride § g-Chloroallyl Chloride § 1,3-Dichloropropene § 1,3-Dichloropropylene § 1,3-Dichloro-2-Propene § Propene, 1,3-Dichloro- § Telone II Soil Fumigant § 3-Chloropropenyl Chloride § alpha,gamma-Dichloropropylene	542756 or 542-75-6 NIOSH: UC 8310000 SAX: CEF750	Carcinogen	—	—	1.91	3.4 PP	4 HA	N/A	0.5

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)									
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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Dieldrin §§ — § Alvit § Quintox § Octalox § Illoxol § Dieldrex § NCI C00124 § Dieldrite § SHA 045001 § RCRA Waste Number P037 § 1,4:5,8-Dimethanonaphthalene § Hexachloroepoxyoctahydro-endo,exo-Dimethanonaphthalene § 3,4,5,6,9,9-Hexachloro-1a,2,2a,3,6,6a,7,7a-Octahydro-2,7:3,6-Dimethanonaphth(2,3-b)Oxirene § 2,7:3,6-Dimethanonaphth(2,3-b)Oxirene, 3,4,5,6,9,9-Hexachloro-1a,2,2a,3,6,6a,7,7a-Octahydro- § 1,2,3,4,10,10-Hexachloro-6,7-Epoxy-1,4,4a,5,6,7,8,8a-Octahydro-Endo, Exo-1,4:5,8-Dimethanonaphthalene	60571 or 60-57-1 NIOSH: IO 1750000 SAX: DHB400	Carcinogen	0.24 PP	0.056 PP	4,670	0.00052 PP	0.02 HA	N/A	0.02
Diethyl Phthalate §§ — § Anozol § Neantine § Solvanol § NCI C60048 § Placidole E § Ethyl Phthalate § Diethylphthalate § Diethyl-o-Phthalate § RCRA WAste Number U088 § 1,2-Benzenedicarboxylic Acid, Diethyl Ester	84662 or 84-66-2 NIOSH: TI 1050000 SAX: DJX000	Toxic	—	—	73	17,000 PP	17,000 PP	0.25	10
Dimethoate §§ —	60-51-5	Toxic	—	—	—	7 HA	7 HA	—	—
Dimethrin §§ —	70-38-2	Toxic	—	—	—	2,000 HA	2,000 HA	—	—
Dimethyl Phthalate §§ — § DMP § NTM § ENT 262 § Mipax § Avolin § Fermine § Solvanom § Solvarone § Palatinol M § Methyl Phthalate § Dimethylphthalate § Phthalic Acid, Dimethyl Ester § Dimethyl Benzene-o-Dicarboxylate § Dimethyl 1,2-Benzenedicarboxylate § 1,2-Benzenedicarboxylic Acid, Dimethyl Ester	131113 or 131-11-3 NIOSH: TI 1575000 SAX: DTR200	Toxic	—	—	36	270,000 PP	270,000 PP	0.04	10
Dimethylphenol, 2,4- §§ Phenol, 2,4-Dimethyl- § m-Xylenol § 2,4-Xylenol § 4,6-Dimethylphenol § Caswell Number 907A § 2,4-Dimethyl Phenol § RCRA Waste Number U101 § 1-Hydroxy-2,4-Dimethylbenzene § 4-Hydroxy-1,3-Dimethylbenzene § EPA Pesticide Chemical Code 086804	105679 or 105-67-9 NIOSH: ZE 5600000 SAX: XKJ500	Toxic	—	—	93.8	380 PP	380 PP	10	10
Dinitro-o-Cresol, 4,6- §§ Dinitrocresol § Detal § Sinox § DNOC § Arborol § Capsine § Dinitrol § Trifocide § Antinonin § Winterwash § Dinitro-o-Cresol § Caswell Number 390 § 2,4-Dinitro-o-Cresol § 4,6-Dinitro-o-Cresol § o-Cresol, 4,6-dinitrn- § RCRA Waste Number P047 § 2-Methyl-4,6-Dinitrophenol § 4,6-Dinitro-2-Methylphenol § 2,4-Dinitro-6-Methylphenol § 3,5-Dinitro-2-Hydroxytoluene § Phenol, 2-Methyl-4,6-Dinitro-	534521 or 534-52-1 NIOSH: GO 9625000 SAX: DUT400	Toxic	—	—	5.5	13 PP	13 PP	—	50
Dinitrophenol, 2,4- §§ Phenol, 2,4-Dinitro § Nitro § Kleenup § Aldifen § 2,4-Dinitrophenol § 2,4-DNP § Chemox PE § Maroxol-50 § Solfo Black B § alpha-Dinitrophenol § Dinitrophenol, 2,4- § Tertrosulphor Black PB § RCRA Waste Number P048 § 1-Hydroxy-2,4-Dinitrobenzene	51285 or 51-28-5 NIOSH: SL 2800000 SAX: DUZ000	Toxic	—	—	1.5	69 PP	69 PP	13	50

Appendix E

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)									
Except where indicated, values are listed as micro-grams-per-liter (µg/L). A '—' indicates that a Standard has not been adopted or information is currently unavailable. A '()' indicates that a detailed note of explanation is provided.									
Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Dinitrotoluene, 2,4- §§ Toluene, 2,4-Dinitro § 2,4-DNT § NCI C01865 § 2,4-Dinitrotoluol - § RCRA Waste Number U105 § Benzene, 1-Methyl-2,4-Dinitro-	121142 or 121-14-2 NIOSH: XT 1575000 SAX: DVH000	Carcinogen	—	—	3.8	0.5 HA	0.5 HA	N/A	10
Dinitrotoluene, 2,6- §§ Toluene-dinitro § 2,4-DNT § Methyl-1,3-Dinitrobenzene § RCRA Waste Number U106	606202 or 606-20-2 NIOSH: XT 1925000 SAX: DVH400	Carcinogen	—	—	—	0.5 HA	0.5 HA	0.01	—
Dinoseb §§ — § DNBP § DBNF § Aretit § Basanite § Caldon § Sparic § Kiloseb § Spurge § Premerge § Dinitro § Hel-Fire § SHA 037505 § Dow General § Sinox General § RCRA Waste Number P020 § Dow General Weed Killer § Vertac General Weed Killer § 2-sec-Butyl-4,6-Dinitrophenol § Dinitro-Ortho-Sec-Butyl Phenol § 2-(1-Methylpropyl)-4,6-Dinitrophenol § 4,6-Dinitro-2-(1-Methyl-n-Propyl)Phenol§ Phenol, 2-(1-Methylpropyl)-4,6-Dinitro-	88857 or 88-85-7 NIOSH: SJ 9800000 SAX: BRE500	Toxic	—	—	—	7 MCL	7 MCL	0.19	1.5
Dioxin --Chlorinated Dibenzo-p-dioxins and Chlorinated Dibenzofurans Dioxins and congeners expressed as equivalent concentration of 2,3,7,8, Tetrachlorodibenzo-p-dioxin (TCDD) based on the method described in Table 5, page 787, of van den Berg, M: Bosveld, ATC: et al. (1998) Toxicity equivalency factors (TEFs) for PCBs, PCDDs, PCDFs for humans and wildlife. Environ Health Perspect 106(12):775-792.	Various	Carcinogen	—	—	5,000	0.00000005 (10) PP	0.000002 (10) HA	N/A	footnote 10
Diphenamid §§ —	957-51-7	Carcinogen	—	—	—	200 HA	200 HA	N/A	—
Diphenylhydrazine, 1,2- §§ Hydrazine, 1,2-Diphenyl- § Hydrazobenzene § NCI C01854 § N,N'-Bianiline § Benzene, Hydrazodi- § RCRA Waste Number U109 § (sym)-Diphenylhydrazine § 1,2-Diphenylhydrazine	122667 or 122-66-7 NIOSH: MW 2625000 SAX: HHG000	Carcinogen	—	—	24.9	0.36 PP	0.36 PP	N/A	10
Diquat §§ — § Actor § Feglox § Deiquat § Reglone § Aquacide § Dextrone § Paraquat § Preeglove § SHA 032201 § Weedtrine-D § Diquat Dibromide § Ethylene Dipyridylium Dibromide § 1,1-Ethylene 2,2-Dipyridylium Dibromide § 5,6-Dihydro-Dipyrido(1,2a,1c)Pyrazinium Dibromide § 9,10-Dihydro-8a,10a-Diazoniaphenanthrene(1,1'-Ethylene-2,'-Bipyridylium)Dibromide	85007 or 85-00-7 NIOSH: JM 5690000 SAX: DWX800	Toxic	—	—	—	20 MCL	20 MCL	0.44	10
Disulfoton §§ --- § Disyston	298-04-4	Toxic	—	—	—	0.3 HA	0.3 HA	0.07	—
Diuron §§ — § Karmex	330-54-1	Toxic	—	—	—	10 HA	10 HA	1	—

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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcantration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Endosulfan §§ — § NCI C00566 § Malixv § Ensure § Bensit § Endacel § Thiodan § Cyclodan § Crisulfan § Benzocpin § Thiosulfan § SHA 079401 § Chlorthiepin § RCRA Waste Number P050 § Endosulfan (mixed isomers) § Hexachlarnhexahydromethano 2,4,3-Benzodioxathicpin-3-Oxide § 1,4,5,6,7,7-Hexachloro-5-Norbornene-2,3-Dimethanol Cyclic Sulfite § 5-Norbornene-2, 3-Dimethanol, 1,4,5,6,7,7-Hexachloro Cyclic Sulfite § 6,7,8,9,10,10-Hexachloro-1,5,5a,6,9,9a-Hexahydro-6,9-Methano-2,4,3-Benzodioxathiepin-3-Oxide § 6,9-Methano-2,4,3-Benzodioxathiepin, 6,7,8,9,10,10-Hexachloro-1,5,5a,6,9,9a-Hexahydro-, 3-Oxide	115297 or 115-29-7 NIOSH: RB 9275000 SAX: BCJ250	Toxic	0.11 PP	0.056 PP	270	110 PP	110 PP	0.014	see Cis and trans isomers
Endosulfan, I §§ — § Thiodan I § Endosulfan-I § Alpha-Endosulfan § alpha-Endosulfan	959988 or 959-98-8 NIOSH: — SAX: —	Toxic	0.22 PP	0.056 PP	270	62 PP	62 PP	—	0.015
Endosulfan, II §§ — § Thiodan II § Endosulfan-II § Beta-Endosulfan § beta-Endosulfan	33213659 or 33213-65-9 NIOSH: — SAX: —	Toxic	0.22 PP	0.056 PP	270	62 PP	62 PP	0.004	0.024
Endosulfan Sulfate §§ — § 6,9-Methann-2,3,4-Benzodioxathiepin, 6,7	1031078 or 1031-07-8 NIOSH: — SAX: —	Toxic	0.22 PP	0.056 PP	270	62 PP	62 PP	0.05	0.05
Endothall §§ — § Hydout § Hydrothal-47 § Aquathol § SHA 038901 § Accelerate § Tri-Endothal § Endothal Hydout § RCRA Waste Number P088 § 3,6-Endooxohexahydrophthalic Acid § Phthalic Acid, Hexahydro-3,6-endo-Oxy- § 7-Oxabicyclo(2,2,1)Heptane-2,3-Dicarboxylic Acid § 1,2-Cyclohexanedicarboxylic Acid, 3,6-endo-Epoxy-	145733 or 145-73-3 NIOSH: RN 7875000 SAX: EAR000	Toxic	—	—	—	100 MCL	100 MCL	1	8
Endrin §§ — § NCI C00157 § Endrex § Mendrin § Nendrin § Hexadrin § SHA 041601 § Compound 269 § RCRA Waste Number P051 § 1,2,3,4,10,10-Hexachloro-6,7-Epoxy-1,4,4(a)5,6,7,8,8a-Octahydro-endo § 3,4,5,6,9,9-Hexachloro-1a,2,2a,3,6,6a,7,7a-Octahydro-2,7:3,6-Dimethanonaphth[2,3-b]oxirene § 1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-Hexachloro 6,7-Epoxy-1,4,4a,5,6,7,8,8a-Octahydro-Endo,Endo-	72208 or 72-20-8 NIOSH: IO 1575000 SAX: EAT500	Toxic with BCF >300	0.086 PP	0.0036 PP	3,970	0.059 PP	2 MCL	N/A	0.3
Endrin Aldehyde §§ —	7421934 or 7421-93-4 NIOSH: — SAX: —	Toxic with BCF >300	—	—	3,970	0.29 PP	0.29 PP	N/A	0.025
Epichlorohydrin §§ — § ECH § Epoxy Propane § -Epichlorohydrin § Chloromethyloxirane § RCRA Waste Number U041 § y-Chloropropyleneoxide § 2-Chloropropylene Oxide § Glycerol Epichlorhydrin § 2,3-Epoxypropyl Chloride § 1-Chlor-2,3-Epoxypropane§ 3-Chlor-1,2-Epoxypropane	106898 or 106-89-8 NIOSH: TX 4900000 SAX: CGN750	Carcinogen	—	—	—	30 HA	30 HA	N/A	—
Escherichia coli (Bacteria)	N/A	Harmful	—	—	—	(13)	Less than 1 (6)	1 per 100ml	1 per 100ml

Appendix E

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)

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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Ethylbenzene §§ — § EB § NCI C56393 § Ethylbenzol § Phenylethane § Etbyl Benzene § Benzene, Ethyl	100414 or 100-41-4 NIOSH: DA 0700000 SAX: EGP500	Toxic	—	—	37.5	530 PP	700 MCL	0.002	0.5
Fenamiphos §§ — § Nemacur	22224-92-6	Toxic	—	—	—	2 HA	2 HA	N/A	—
Fluometurnn §§ — § Fln-Met	2164-17-2	Carcinogen	—	—	—	90 HA	90 HA	N/A	—
Fluoranthene §§ — § Idryl § Benzo(jk)Floorene § Benzo(j,k)Fluorene § 1,2-Benzacenaphthene § RCRA Waste Number U120 § 1,2-(1,8-Naphthylene)Benzene § Benzene, 1,2-(1,8-Naphthalenediyl)-	206440 or 206-44-0 NIOSH: LL 4025000 SAX: FDF000	Toxic with BCF >300	—	—	1,150	130 PP	130 PP	N/A	10
Fluorene (PAH) §§ — § 9H-Fluorene § Diphenylenemethane § o-Biphenylenemethane § 2,2'-Metbylenebiphenyl	86737 or 86-73-7 NIOSH: — SAX: —	Toxic	—	—	30	1,100 PP	1,100 PP	0.25	0.25
Fluoride §§ Flourine § Flunride § Fluoride(1-) § Perfluoride § Fluoride Ion § Fluorine, Ion § Soluable§ Fluoride § RCRA Waste Number P056 § Hydrofluoric Acid, Ion(1-)	16984488 or 16984-48-8 NIOSH: LM 6290000 SAX: FEX875	Toxic	—	—	—	4,000 MCL	4,000 MCL	5	100
Fonofos §§ — § Dyfonate	944-22-9	Toxic	—	—	—	10 HA	10 HA	—	—
Gamma Emitters (11) §§ —	Multiple	Carcinogen / Radioactive	—	—	—	0.4 mrem /yr MCL	0.4 mrem /yr MCL	N/A	—
gamma-Chlordane §§ — § Chlordane, beta-Isomer	5103742 or 5103-74-2 NIOSH: — SAX: —	Carcinogen	—	—	14,100	0.0080 PP	1 HA	N/A	0.4
gamma-hexachlorocyclohexane §§ Lindane § BHC § -BHC § Gamene § Lintox § Lentox § Hexcide § Aparsin § Agrocide § Afeide § BHC-gamma § gamma-BHC § HCH-gamma § gamma-HCH § Hexachlorocyclohexane § gamma-Hexachlorobenzene § gamma-Benzenehexachloride § gamma-Benzene Hexachloride § Hexachlorocyclohexane-gamma § Hexachlorocyclohexane (gamma) § Benzene Hexachloride-gamma-isnmer § gamma-1,2,3,4,5,6-Hexachlorocyclohexane § Cyclohexane, 1,2,3,4,5,6-Hexachloro-, gamma-isomer § 1,2,3,4,5,6-Hexachlorocyclohexane, gamma-isomer § 1-alpha,2-alpha,3-beta,4-alpha, 5-alpha,6-beta-Hexachlorocyclohexane § Cyclohexane, 1,2,3,4,5,6-Hexachloro-, (1-alpha, 2-alpha, 3-beta, 4-alpha, 5-alpha, 6-beta)	58899 or 58-89-9 NIOSH: GV 4900000 SAX: BBQ500	Carcinogen	0.95 PP	—	130	0.2 HA	0.2 HA	N/A	0.1
Gases, dissolved, total-pressure (20) §§ —	Multiple	Toxic	110% of saturation	—	—	—	—	—	—

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			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Glyphosate §§ — § Jury § Honcho § Rattler § Weedoff § Roundup § Glifonox § n-(Phosphonomethyl)-Glycine § Glycine, n-(Phnsphonomrthyl)- § Glyphosate plus inert ingrediants § MON 0573	1071836 or 1071-83-6 NIOSH: MC 1075000 SAX: PHA500	Toxic	—	—	—	700 MCL	700 MCL	6	50
Glyphosate Isopropylamine Salt §§ — § SHA 103601	38641940 or 38641-94-0 NIOSH: — SAX: —	Toxic	—	—	—	700 HA	700 HA	6	50
Guthion §§ — § DBD § NCI C00066 § Carfene § Gothnion § Azinphos § Crysthyon § Gusathion § Bay 17147 § Methylazinphos § Methyl Guthion § Methyl-Guthion § Azinphos-Mcthyl § Azinphos Methyl § Caswell Nomber 374 § EPA Pesticide Chemical Code 058001 § o,o-Dimethylphosphorodithioate S-Ester § 3-Mercaptomethyl)-1,2,3-Benzotriazin-4(3H)-One § Benzotriazinedithiophosphoric Acid Dimethoxy Ester § 3-Dimethoxyphosphinothiomethyl-1,2,3-Benzotriazin-4(3H)-One § Phosphorodithioic Acid, O,O-Dimethyl Ester, S-Ester with 3-(Mercaptomethyl)-1,2,3-Benzotriazin-4(3H)-One	86500 or 86-50-0 NIOSH: TE 1925000 SAX: ASH500	Toxic	—	0.01 NPP	—	—	—	—	—
Heptachlor §§ — § NCI C00180 § Drinox § Heptamol § Agroceris § Heptagran § SHA 04481 § Rhodiachlor § Velsicol-104 § RCRA Waste Nomber P059 § 3,4,5,6,7,8,8a-heptachlorodicyclopentadiene § Dicyclopentadiene, 3,4,5,6,7,8,8a-Heptachloro- § 1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-Tetrahydro-4,7-Methanol-1H-Indene § 4,7-Methano-1H-Indene, 1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-Tetrahydro- § 1(3a),4,5,6,7,8,8-Heptachloro-3a(1),4,7,7a-Tetrahydro-4,7-Methanoindene	76448 or 76-44-8 NIOSH: PC 0700000 SAX: HAR000	Carcinogen	0.52 PP	0.0038 PP	11,200	0.00079 PP	0.08 HA	N/A	0.2
Heptachlor Epoxide §§ — § HCE § Velsicol 53-CS-17 § Epoxyheptachlor § 1,4,5,6,7,8,8-Heptachloro-2,3-Epoxy-2,3,3a,4,7,7a-Hexahydro-4,7-Methanoindene § 2,5-Methano-2H-Indeno[1,2b]Oxirene, 2,3,4,5,6,7,7-Heptachloro-1a,1b,5,5a,6,6a-Hexahydro- (alpha, beta, and gamma isomers)	1024573 or 1024-57-3 NIOSH: PB 9450000 SAX: EBW500	Carcinogen	0.26 PP	0.0038 PP	11,200	0.00039 PP	0.04 HA	N/A	0.1
Hexachlorobenzene §§ — § HCB § Amatin § Smut-Go § Sanocide § Anticaric § Bunt-Cure § Bont-No-More § Perchlorobenzene § Phenyl Perchloryl § No Bunt Liquid § Julin's Carbon Chloride § Co-op Hexa § Hexa C.B. § Benzene, Hexachloro-	118741 or 118-74-1 NIOSH: DA 2975000 SAX: HCC500	Carcinogen	—	—	8,690	0.0028 PP	0.2 HA	N/A	0.2
Hexachlorobutadiene §§ — § HCBD § Dolan-Pur § Perchlorobotadiene § RCRA Woste Nomber U128 § 1,3-Hexachlorobutadiene § 1,3-Butadiene, Hexachloro- § 1,1,2,3,4,4-Hexachloro-1,3-Butadiene § 1,3-Butadiene, 1,1,2,3,4,4-Hexachloro-	87683 or 87-68-3 NIOSH: EJ 0700000 SAX: PCF000	Carcinogen	—	—	2.78	4.4 PP	5 HA	N/A	10

Appendix E

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)									
Except where indicated, values are listed as micro-grams-per-liter (µg/L). A '—' indicates that a Standard has not been adopted or information is currently unavailable. A '( )' indicates that a detailed note of explanation is provided.									
Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Hexachlorocyclohexane §§ — § BHC § DBH § HCH § HCCH § HEXA § Hexylan § Hexachlor § Gammexane § Hexachloran § Compound 666 § Benzenchexachloride § Benzene Hexachloride	608731 or 608-73-1 NIOSH: GV 3150000 SAX: BBP750	Carcinogen	—	—	130	0.039 PP	0.039 PP	N/A	0.1
Hexachlorocyclopentadiene §§ — § HEX § HCP § PCL § C-56 § HCCPD § NCI C55607 § Hexachloropentadiene § RCRA Waste Number U130 § Perchlorocyclopentadiene § 1,3-Cyclopentadiene, 1,2,3,4,5,5-Hexachloro-	77474 or 77-47-4 NIOSH: GV 1225000 SAX: HCE500	Toxic	—	—	4.34	40 PP	50 MCL	1	5
Hexachloroethane §§ — § Avlotane § Distokal § Distopan § Distopin § Egitol § Falkitol § Fasciolin § NCI C04604 § Phenohcp § Mottenhexe § Perchloroethane § Hexachloroethylene § Ethane, Hexachloro- § Carbon Hexachloride § Ethane Hexachloride § Ethylene Hexachloride § RCRA Waste Number U131 § 1,1,1,2,2,2-Hexachloroethane	67721 or 67-72-1 NIOSH: KI 4025000 SAX: HCI000	Carcinogen	—	—	86.9	14 PP	30 HA	N/A	10
Hexazinone §§ —	51235-04-2	Toxic	—	—	—	400 HA	400 HA	1	—
Hydrogen Sulfide §§ — § Stink Damp § Sulfur Hydride § Hydrogen Sulphide § Dihydrogen Sulfide § Hydrosulfuric Acid § Sulfurated Hydrogen § RCRA Waste Number U135 § Dihydrogen Monosulfide § Hydrogen Sulfuric Acid	7783064 or 7783-06-4 NIOSH: MX 1225000 SAX: HIC500	Toxic	—	2 NPP	—	—	—	NA	—
Imazamethabenz-methyl §§ Assert § —	81405-85-8	Toxic	—	—	—	400 I	400 I	N/A	—
Imazapyr §§ Arsenal § —	81334-34-1	Toxic	—	—	—	21,000 I	21,000 I	N/A	—
Indeno(1,2,3-cd)pyrene (PAH) §§ — § o-Phenylenepyrene § 2,3-Phenylenepyrene § 2,3-o-Phenylenepyrene § RCRA Waste Number U137 § Indeno (1,2,3-cd) Pyrene § 1,10-(o-Phenylene)Pyrene § 1,10-(1,2-Phenylene)Pyrene	193395 or 193-39-5 NIOSH: NK 9300000 SAX: IBZ000	Carcinogen	—	—	30	0.038 PP	0.5 (30) HA	N/A	0.10
Iron §§ Fe § Ancor EN 80/150 § Carbonyl Iron § Armco Iron	7439896 or 7439-89-6 NIOSH: NO 4565500 SAX: IGK800	Harmful (aquatic life)	—	1,000 NPP	—	(23)	(23)	N/A	50
Isophorone §§ — § Isoforon § NCI C55618 § Isoacetophorone § alpha-Isophorone § 1,1,3-Trimethyl-3-Cyclohexene-5-One § 3,5,5-Trimethyl-2-Cyclohexene-1-One § 3,5,5-Trimethyl-2-Cyclohexone	78591 or 78-59-1 NIOSH:GW 7700000 SAX: IHO000	Carcinogen	—	—	4.38	350 PP	400 HA	N/A	10

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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Lead §§ Pb § C.I. 77575 § C.I. Pigment Metal 4 § Glover § Lead Flake § Lead 22 § Omaha § Omaha & Grant § SI § SO	7439921 or 7439-92-1 NIOSH: OF 7525000 SAX: LCF000	Toxic	13.98 @ 25 mg/l hardness (12) PP	0.545 @ 25 mg/l hardness (12) PP	49	15 PP	15 PP	0.1	0.5
m-Xylene §§ — § m-Xylol § 1,3-Xylene § meta-Xylene § m-Dimethylbenzene § m-Methyltoluene § 1,3-Dimethylbenzene § 1,3-Dimethyl Benzene	108383 or 108-38-3 NIOSH: ZE 2275000 SAX: XHA000	Toxic	—	—	1.17	10,000 MCL	10,000 MCL	0.5	1.5
Malathion §§ — § Formal § Sumitox § Emmatos § Celthion § Forthion § Malacide § Kop-Thion § Calmathion § Carbethoxy § NCI C00215 § Carbethoxy Malathion § SHA 057701 § Phosphothion § S-1,2-Bis(Ethoxycarbonyl)Ethyl-O,O-Dimethyl Thiophosphate § O, O-Dimethyl-S-(1,2-Dicarbethoxyethyl) Dithiophosphate § O,O-Dimethyl S-1,2-Di(Ethoxycarbamyl)Ethyl Phosphorodithioate § Succinic Acid, mercapto-, diethyl ester, S-Ester with O,O-Dimethyl Phosphorodithioate	121755 or 121-75-5 NIOSH: WM 8400000 SAX: CBP000	Toxic	—	0.1 NPP	—	100 HA	100 HA	—	—
Manganese §§ Mn § Colloidal Manganese § Magnacat § Trowamang	7439965 or 7439-96-5 NIOSH: OO 9275000 SAX: MAP750	Harmful	—	—	—	(24)	(24)	N/A	5
MCPA §§ 4-chloro-2 methylphenoxy acetic acid	94-74-6	Toxic	—	—	—	4 HA	4 HA	N/A	—
MCPP §§ Mecoprop § (+)-2-(4-chloro-2-methylphenoxy)-propanoic acid	7085-19-0	Toxic	—	—	—	7 1	7 1	—	—
Mercury §§ Hg § Colloidal Mercury § Mercury, Metallic § NCI C60399 § Quick Silver § RCRA Waste Number U151	7439976 or 7439-97-6 NIOSH: OV 4550000 SAX: MCW250	Toxic with BCF >300	1.7 PP	0.91 PP	5,500	0.05 PP	2 MCL	N/A	0.01
Metalaxyl § Ridomil § —	57837-19-1	Toxic	—	—	—	420 1	420 1	3.5	—
Methamidophos §§ Monitor § —	10265-92-6	Toxic	—	—	—	0.35 1	0.35 1	—	—
Methomyl §§ Lannate § —	16752-77-5	Toxic	—	—	—	200 HA	200 HA	1	—
Methoxychlor §§ — § DMDT § Metox § Moxie § Methoxcide § NCI C00497 § Methoxy-DDT § Dimethoxy-DDT § RCRA Waste Number U247 § 1,1,1-Trichloro-2,2-Bis(p-Methoxyphenyl)Ethane § Benzene, 1,1'-(2,2,2-Trichloroethylidene)Bis[4-Methoxy- § 1,1'-(2,2,2-Trichloroethylidene)Bis[4-Methoxybenzene] § Ethane, 1,1,1-Trichloro-2,2-Bis(p-Methoxyphenyl)-	72435 or 72-43-5 NIOSH: KJ 3675000 SAX: DOB400	Toxic	—	0.03 NPP	—	40 MCL	40 MCL	—	1

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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Raquired Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Metsulfuron Methyl §§ Ally § —	74223-64-6	Toxic	—	—	—	1,750 I	1,750 I	0.1	—
Methyl Chloride §§ Chloromethane § Arctic § Monochloromethane § RCRA Waste Number U045	74873 or 74-87-3 NIOSH: PA 6300000 SAX: CHX500	Toxic	—	—	3.75	30 HA	30 HA	0.08	—
Metolachlor §§ Dual § —	51218-45-2	Carcinogen	—	—	—	100 HA	100 HA	N/A	—
Metribuzin §§ Sencor § —	21087-64-9	Toxic	—	—	—	200 HA	200 HA	10	—
Mirex §§ — § NCI C06428 § Dechlorane § Bichlorendo § Ferriamicide § Perchloropentacyclodecane § Dodecachloropentacyclndecane § Hexachlorncyclopentadiene Dimer § Cyclnpentadieoe, Hexachloro-, Dimer § Perchloropentacyclo(5.2.1.0[sup 2,6].0[sup 3,9].0[sup 5,8])Decane § Dodecachlorooctahydro-1,3,4-Metheno-2H-Cyclobuta (c,d)Pentalene § 1,1a,2,2,3,3a,4,5,5,5a,5b,6-Dodecachlrooctahydro-1,3,4-Metheno-1H-Cyclobuta(cd) Pentalene § 1,3,4-Metheno-1H-Cyclobuta[cd]Pentalene, 1,1a,2,2,3,3a,4,5,5,5a,5b,6,-Dodecachlornoctahydro-	2385855 or 2385-85-5 NIOSH: PC 8225000 SAX: MQW500	Carcinogen	—	0.001 NPP	—	14 I	14 I	0.01	0.1
MTBE §§ Methyl Tertiary-Rutyl Ether	1634-04-4	Harmful	—	—	—	30 (21)	30 (21)	—	—
N-Nitrnsodimethylamine §§ Dimethylnitrnsamine A707 § DMN § NDMA § DMNA § Nitrosodimethylamine § Dimethylnitrosoamine § N-Nitrosndimethylamine § RCRA Waste Number P082 § N,N-Dinethylnitrosamine § Methylamine, N-Nitrosodi- § Dimethylamine, N-Nitroso- § N-Methyl-N-Nitrosomethanamine § Methamine, N-Methyl-N-Nitroso- § Methanamine, N-Methyl-N-Nitroso-	62759 or 62-75-9 NIOSH: IQ 0525000 SAX: DSY400	Carcinogen	—	—	0.026	0.0069 PP	0.0069 PP	N/A	10
N-Nitrosodiphenylamine §§ — § NDPA § NDPhA § Vultrol § Curetard A § NCI C02880 § Redax § TJP § Retarder J § Vulcalent A § Vulcatard § Vultrol § Nitrosndiphenylamine § Diphenylnitrosamine § N,N-Diphenylnitrosamine § N-Nitroso-N-Phenylaniline § Diphenylamine, N-Nitroso- § Benzenamine, N-Nitroso-N-Phenyl-	86306 or 86-30-6 NIOSH: JJ 9800000 SAX: DW1000	Carcinogen	—	—	136	33 PP	33 PP	N/A	10
n-Dioctyl Phthalate §§ — § DNOP § PX-138 § Vinicizer 85 § Dinopol NOP § n-Octyl Phthalate § Octyl Phthalate § Dioctyl Phthalate § Di-n-Octyl Phthalate § Di-sec-Octyl Phthalate § RCRA Waste Number U107 § 1,2-Benzenedicarhoxylic Acid, Dioctyl Ester	117840 or 117-84-0 NIOSH: TI 1925000 SAX: DVL600	Carcinogen	—	—	—	—	—	N/A	10

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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
N-Nitrosodi-N-Propylamine §§ — § DPN § DPNA § NDPA § Dipropylnitrosamine § N-Nitrosodipropylamine § Di-n-Propylnitrosamine § RCRA WAste Number U111 § Dipropylamine, N-Nitroso- § N-Nitrosodi-n-propylamine § N-Nitroso-di-n-propylamine § 1-Propanamine, N-Nitroso-n-Propyl-	621647 or 621-64-7 NIOSH: JL 9700000 SAX: DWU600	Carcinogen	—	—	1.13	0.05 PP	0.05 PP	N/A	10
N-Nitrosopyrrolidene §§ — § NPYR § NO-pyr § N-N-pyr § 1-Nitrosopyrrolidene § Pyrrolidine, 1-Nitroso- § RCRA Waste Number U180 § Tetrahydro-N-Nitrosopyrrole § Pyrrole, Tetrahydro-N-Nitrosa-	930552 or 930-55-2 NIOSH: UY 1575000 SAX: NLP500	Carcinogen	—	—	0.055	0.16 PP	0.16 PP	N/A	10
Naphthalene §§ Moth Balls § Mighty 150 § NCI C52904 § Naphthene § White Tar§ Naphthalin § Tar Camphor § Caswell Number 587 § RCRA Waste Number U165 § EPA Pesticide Chemical Code 055801	91203 or 91-20-3 NIOSH: QJ 0525000 SAX: NAJ500	Carcinogen	—	—	10.5	100 HA	100 HA	0.04	10
Nickel §§ Ni § C.I. 77775 § Ni 270 § Nickel 270 § Ni 0901-S § Ni 4303T § NP 2 § Raney Alloy § Raney Nickel	7440020 or 7440-02-0 NIOSH: QR 5950000 SAX: NCW500	Toxic	145@25mg/l hardness (12) PP	16.1 @ 25 mg/l hardness (12) PP	47	100 HA	100 HA	0.5	10
Nicosulfuron §§ Accent § —	111991-09-4	Toxic	—	—	—	8,750 I	8,750 I	0.01	—
Nitrate (as Nitrogen[N]) §§ NO3	14797558 or 14797-55-8 NIOSH: — SAX: —	Toxic	(8)	(8)	—	10,000 MCL	10,000 MCL	10, surface water 5000, ground water, see ARM 17.30.715	10
Nitrate plus nitrite (as Nitrogen[N]) §§ $NO_3 + NO_2$	See nitrate and nitrite NIOSH: — SAX: —	Toxic	(8)	(8)	—	10,000 MCL	10,000 MCL	10, surface water 5000, ground water, see ARM 17.30. 715	10
Nitrite (as Nitrogen[N]) §§ NO_2	14797650 or 14797-65-0 NIOSH: — SAX: —	Toxic	(8)	(8)	—	1,000 MCL	1,000 MCL	4	10
Nitrobenzene §§ — § NCI C60082 § Mirbane Oil § Nitrobenzol § Oil of Mirbane § Benzene, Nitro- § Essence of Myrbane § RCRA Waste Number U169	98953 or 98-95-3 NIOSH: DA 6475000 SAX: NEX000	Toxic	—	—	2.89	17 PP	17 PP	1.9	10

Appendix E

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)

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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Nitrogen, total inorganic (as Nitrogen[N]) §§ the sum of ammonia, nitrite, and nitrate	See ammonia, nitrate, and nitrite	Nutrient	(8)	(8)	—	—	—	10	10
Nitrophenol, 4- §§p-Nitropheno (DOT)l § 4-Hydroxyoitrobenzene § NCI C55992) § RCRA Waste Number U170	100027 or 100-02-7 NIOSH: SM 2275000 SAX: NIF000	Toxic	—	—	3.31	60 HA	60 HA	2.4	—
o-Nitrophenol §§ — § 2-Nitrophenol § 2-Hydroxyoitrobenzene	88755 or 88-75-5 NIOSH: SM 2100000 SAX: NIE500	Toxic	—	—	2.33	—	—	0.45	—
o-Xylene §§ — § o-Xylol § 1,2-Xylene § ortho-Xylene § o-Methyltoluene § o-Dimethylbenzene § 1,2-Dimethylbenzene § 1,2-Dimethyl Benzene	95476 or 95-47-6 NIOSH: ZE 2450000 SAX: XHJ000	Toxic	—	—	1.17	10,000 MCL	10,000 MCL	0.5	1.5
Oxamyl §§ — § D-1410 § DPX 1410 § Insecticide-Nematicide 1410 § Vydate § Thioxamyl § Methyl 2-(Dimethylamino)-N- § Vydate L, Insecticide/Nematicide § ({[Methylamino]Carbooyl}Oxy)-2-Oxocthanimidothioate § 2-Dimethylamioo-1-(Methylthio)Glyoxal O-Methylcarbamoylmooozime § S-Methyl 1-Dimethylcarbamoyl)-N ({Methylcarbamoyl}Oxy)Thioformimidate § Methyl N',N'-Dimethyl-N-({Methylcarbamoyl}Oxy)-1-Thiooxamimidate § N',N'-Dimethyl-N-[(Methylcarbamoyl)oxy]-1-Methylthionxamimidic Acid	23135220 or 23135-22-0 NIOSH: RP 2300000 SAX: DSP600	Toxic	—	—	—	200 MCL	200 MCL	1	1
Oxydemeton Methyl §§ Metasystox R § —	301-12-2	Toxic	—	—	—	3.5 I	3.5 I	1.4	—
Oxygeo, dissolved (20) §§ O2 § Oxygen, Compressed § Oxygen, Refrigerated Liquid	7782447 or 7782-44-7 NIOSH: RS 2060000 SAX: OQW000	Toxic	(15)	(15)	—	—	—	—	50
p,p'-Dichlorodiphenyldichloroethylene §§ DDE § DDE § p,p'-DDE § 4,4'-DDE § NCI C00555 § Dichlorodiphenyldichloroethyleoe § Dichlorodiphenyldichloroethyleoe, p,p'- § 2,2'-bis(4-Chlorophenyl)-1,1-Dichloroethylene § 1,1'-(Dichlornethenylidenc)bis(4-Chlorobcozene) § 2,2'-bis(p-Chlorophenyl)-1,1-Dichlornethylene § Benzeoe, 1,1'-(DichloroethenylideneBis[4-Chloro-	72559 or 72-55-9 NIOSH: KV 9450000 SAX: BIM750	Carcinogeo	—	—	53,600	0.0022 PP	0.0022 PP	N/A	0.01
p,p'-Dichlorodiphenyltrichloroethane §§ DDT § DDT § 4,4'-DDT § Agritao § Anoflex § Arkotine § Azotox § Bosan Supra § Bnvidermol § Chlorophenothan § Chlorophenothane § Chlorophenotoxom § Citox § Clofenotane § Dedelo § § Chlnrophenothane § Diphenyltrichlorocthane § Dichlorodipheoyltrichloroethane § 4,4'-Dichlorodipheoyltrichloroethane § Dichlorodipheoyltrichlorocthane, p,p'- § 1,1,1-Trichloro-2,2,-bis(p-Chlorophenyl) Ethane § 1,1,1-Trichloro-2,2,-bis(p-Chlorophenyl)Ethane § 1,1,1-Trichloro-2,2,-Di(4-Chlorophenyl)-Ethane § 1,1-Bis-(p-Chlorophenyl)-2,2,2-Trichlorocthane § 2,2-Bis-(p-Chlorophenyl)-1,1,1-Trichlorocthane § Benzene, 1,1'-(2,2,2-Trichlorocthylidene)Bis(4-Chloro-) § alpha,alpha-Bis(p-Chlorophenyl)-beta,beta,beta-Trichlorcthane	50293 or 50-29-3 NIOSH: KJ 3325000 SAX: DAD200	Carcinogen	1.1 PP	0.001 PP	53,600	0.0022 PP	0.0022 PP	N/A	0.06

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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
p,p'-Dichlorodiphenyldichloroethane §§ DDD § TDE § Dilene § NCI C00475 § Rothane § Rhothane § 4,4'-DDD § p,p'-DDD § p,p'-TDE § 4',4'-D-DDD § RCRA Waste Number U060 § Tetrachlorodiphenylethane § Dichlorodiphenyldichloroethane § Dichlorodiphenyl Dichloroethane § 2,2-bis (4-Chlorophenyl)-1,1-Dichloroethaoe § 1,1-Dichloro-2,2-bis(p-Chlorophenyl) Ethane § 1,1-bis(4-Chlorophenyl)-2,2-Dichloroethane § 2,2-bis(p-Chlorophenyl)-1,1-Dichloroethane § Benzene, 1,1'(2,2-Dichloroethylidene)Bis[4-Chloro-	72548 or 72-54-8 NIOSH: KI 0700000 SAX: BIM500	Carcinogen	—	—	53,600	0.0031 PP	0.0031 PP	N/A	0.01
p-Bromodiphenyl Ether §§ Benzene, 1-Bromo-4-Phenoxy- § p-Bromodiphenyl Ether § 4-Bromophenoxybenzene § 4-Bromodiphenyl Ether § 1-Bromo-4-Phenoxybenzene § p-Bromophenylphenyl Ether § 4-Bromophenyl Phenyl Ether	101553 or 101-55-3 NIOSH: — SAX: —	Toxic with BCF >300	—	—	1,640	—	—	N/A	10
p-Chloro-m-Cresol §§— § PCMC § Parol § Aptal § Baktol § Baktolan § Ottafact § Raschit § Rasen-Anicon § Parmetol § Candasetpic § Chlorocresol § Preventol CMK § RCRA Waste Number U039 § Parachlorometra Cresol § 4-Chloro-3-methylphenol § 2-Chloro-Hydroxytoluene § Phenol, 4-Chloro-3-methyl- § Chlorophenol, 4-, methyl, 3-	59507 or 59-50-7 NIOSH: GO 7100000 SAX: CFE250	Harmful	—	—	—	3,000 PP	3,000 PP	N/A	20
p-Xylene §§ — § p-Xylol § Chromar § Scintillar § 1,4-Xylene § para-Xylene § p-Methyltoluene § p-Dimethylbenzene § 1,4-Dimethylbenzene § 1,4-Dimethyl Benzene	106423 or 106-42-3 NIOSH: ZE 2625000 SAX: XHS000	Toxic	—	—	1.17	10,000 MCL	10,000 MCL	0.5	1.5
Paraquat Dichloride §§ —	1910-42-5	Toxic	—	—	—	30 HA	30 HA	0.8	—
Parathion §§ — § DNTP § Niran § Phoskil § Paradost § Stathion § Strathion § Pestox Plus § Nitrostigmine § Parathion Ethyl § Parathion-ethyl § Ethyl Parathion § Diethylparathion § Caswell Number 637 § RCRA Waste Number P089 § EPA Pesticide Chemical Code 057501 § Diethyl 4-Nitrophenylphosphorothioate § Diethyl para-Nitrophenol Thiophosphate § Diethyl-p-Nitrophenyl Monothiophosphate § O,O-Diethyl O-4-Nitrophenyl Thiophosphate § Phosphorothioic Acid, O,O-Diethyl O-(4-Nitrophenyl) Ester	56382 or 56-38-2 NIOSH: TF 4920000, dry TF 4950000, liquid SAX: PAK250, dry	Carcinogen	0.065 NPP	0.013 NPP	—	—	—	—	1
Pentachlorobenzene §§ Benzene, Pentachloro- § QCB- § RCRA Waste Number U183	608935 or 608-93-5 NIOSH: DA 6640000 SAX: PAV500	Toxic with BCF >300	—	—	2,125	1.4 PP	1.4 PP	N/A	0.1

Appendix E

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)

Except where indicated, values are listed as micro-grams-per-liter (µg/L). A '—' indicates that a Standard has not been adopted or information is currently unavailable. A '( )' indicates that a detailed note of explanation is provided.

Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Pentachlorophenol §§ Penta § PCP § Durotox § Weedone § Chem-Tol § Lauxtol A § NCI C54933 § NCI C55378 § NCI C56655 § Permite § Dowcide 7 § Permacide § Penta-Kil§ Permagard § Penchlorol § Chlornpben § Pentachlorphenol § Pentaclorofenolo § Thompson's Wood Fix § Phenol, Pentachloro- § 2,3,4,5,6-Pentachlorophenol § 1-Hydroxy- 2,3,4,5,6-Pentachlorobenzene	87865 or 87-86-5 NIOSH: SM 6300000 SAX: PAX250	Carcinogen	5.3 @ pH of 6.5 (14) PP	4 @ pH of 6.5 (14) PP	11	1 MCL	1 MCL	N/A	0.05
pH §§ —	N/A	Harmful	(13)	(13)	—	(18)	(18)	N/A	—
Phenanthrene (PAH) §§ — § Phenantrio	85018 or 85-01-8 NIOSH: SF 7175000 SAX: PCW250	Toxic	—	—	30	—	—	0.01	0.25
Phenol §§ — § Baker's P and S Liquid and Ointment § NCI C50124 § Benzenol § Monophenol § Oxybenzene § Phenic Acid § Carbolic Acid § Phenylic Acid § Hydroxybenzene § Hydroxybenzene § Phenyl Alcohol § Phenyl Hydrate § Phenylic Alcohol § Phenyl Hydroxide § Benzene, Hydroxy- § Monohydroxybenzene § RCRA Waste Number U188	108952 or 108-95-2 NIOSH: SJ 3325000 SAX: PDN750	Harmful	—	—	1.4	300 PP	300 PP	100	10
Phosphorus, inorganic (20) §§ — § Ortho-phosphorus § phosphorus, Ortho- § reactive phosphorus	14265442 or 14265-44-2 NIOSH: — SAX: —	Nutrient	(8)	(8)	—	—	—	1	1
Picloram §§ Tordon § ATCP § K-Pin § Borolin § Amdon Grazon § NCI C00237 § Tordon 10K § Tordon 22K § Tordon 101 Mixture § 3,5,6-Trichloro-4-Aminopicolinic Acid § 4-Amino-3,5,6-Trichloropicnlinic Acid	1918021 or 1918-02-1 NIOSH: TJ 7525000 SAX: AMU250	Toxic	—	—	—	500 MCL	500 MCL	0.14	1
Polychlorinated Biphenyls, (sum of all homolog, all isomer, all congener or all Aroclor analyses) §§ PCB's § Aroclor 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1268, 2565, 4465 § Chlophen § Chlorextol § Chlorinated Biphenyl § Chlorinated Diphenyl § Chlorinated Diphenylene § Chloro Biphenyl § Chloro-1,1-Biphenyl § Clophen § Dykanol § Fenclor § Inerteen § Kanechlor 300, 400, 500 § Montar § Noflamol § PCB (DOT) § Phenochlor § Polychlornbiphenyl § Pyralene § Pyranol § Santotherm § Sovol § Therminol FR-1	Multiple	Carcinogen	—	0.014 PP	31,200	0.00064 PP	0.5 MCL	N/A	1
Primisolfuron Methyl §§ Beacon § Exceed	86209-51-0	Toxic	—	—	—	42 1	42 1	0.1	—
Prometon §§ Pramitol § —	1610-18-0	Toxic	—	—	—	100 HA	100 HA	0.3	—
Pronamide §§ Kerb § —	23950-58-5	Carcinogen	—	—	—	50 HA	50 HA	N/A	—

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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Propachlor §§ Ramrod § —	1918-16-7	Toxic	—	—	—	90 HA	90 HA	0.5	—
Propane, 1,2-Dibromo-3-Chloro- §§ Dibromochloropropane § 1,2-Dibromo-3-Chloropopane § Fumagon § Fumazone § NCI C00500 § Nemabrom § Nemafume § Nemagon § Nemagone § Nemagone Soil Fumigant § Nemanax § Nemapaz § Nemaset § Nematocide § Nematox § OS 1897 § OXV DBCP § SD 1897 § Caswell Number 287 § RCRA Waste Number U066§ 1-Chloro-2,3-Dibromopropane § DBCP § EPA Pesticide Chemical Code 011301	96128 or 96-12-8 NIOSH: TX 8750000 SAX: DDL800	Carcinogen	—	—	—	0.2 MCL	0.2 MCL	N/A	0.05
Propazine §§ —	139-40-2	Carcinogen	—	—	—	10 HA	10 HA	N/A	—
Propham §§ —	122-42-9	Toxic	—	—	—	100 HA	100 HA	0.13	—
Propoxur §§ Baygon § —	114-26-1	Carcinogen	—	—	—	3 HA	3 HA	N/A	—
Pyrene (PAH) §§ — § ß-Pyrine § beta-Pyrene § Benzo(def)Phenanthrene § Benzo[def]Phenanthrene	129000 or 129-00-0 NIOSH: UR 2450000 SAX: PON250	Toxic	—	—	30	830 PP	830 PP	0.25	0.25
Radium 226 §§ —	Radium 226 13982636 or 13982-63-6 NIOSH: — SAX: —	Carcinogen / Radioactive	—	—	—	5 picocuries/liter Note: The sum of Radium 226 and 228. MCL	5 picocuries/liter Note: The sum of Radium 226 and 228. MCL	N/A	—
Radium 228 §§ —	Radium 228 15262201 or 15262-20-1 NIOSH: — SAX: —	Carcinogen / Radioactive	—	—	—	5 picocuries/liter Note: The sum of Radium 226 and 228. MCL	5 picocuries/liter Note: The sum of Radium 226 and 228. MCL	N/A	—
Radon 222 §§ —	14859677 or 14859-67-7 NIOSH: — SAX: —.	Carcinogen / Radioactive	—	—	—	15 picocuries/ liter HA	15 picocuries/ liter HA	N/A	—
Selenium §§ Se § C.I. 77805 § Colloidal Selenium § Elemental Selenium § Selenium Alloy § Selenium Base § Selenium Dust § Selenium Elemental § Selinium Homopolymer§ Selenium Metal Powder, Non-Pyrophoric § Vandex	7782492 or 7782-49-2 NIOSH: VS 7700000 VS 8310000, colloidal SAX: SBO500 SAX: SBP000, colloidal	Toxic	20 PP	5 PP	4.8	50 MCL	50 MCL	0.6	1
Silver §§ Ag § Argentum § C.I. 77820 § Shell Silver § Silver Atom	7440224 or 7440-22-4 NIOSH: VW 3500000 SAX: SD1500	Toxic	0.374 @ 25 mg/l hardness(12) PP	—	0.5	100 HA	100 HA	0.2	0.5

Appendix E

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)									
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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Simazine §§ — § CDT § Herbex § Framed § Bitemol § Radokor § A 2079 § Batazina § Cat (Herbicide) § CET § G 27692 § Geigy 27,692 § Gesaran § Gesatop 50 § Simazine 80W § Symazine § Taphazine § W 6658 § Zeapur § Princep § Aquazine § Herbazin § Tafazine § 2,4-bis(Ethylaminn)-6-Chlorn-s-Triazine § 1-Chloro, 3,5-Bisethylamino-2,4,6-Triazine § 2-Chloro-4,6-Bis(Ethylamino)-1,3,5-Triazine § 6-Chloro-N,N'-Diethyl-1,3,5-Triazine-2,4-Diyldiamine	122349 or 122-34-9 NIOSH: XY 5250000 SAX: BJP000	Carcinogen	—	—	—	4 MCL	4 MCL	N/A	0.3
Strontium §§ —	7447246 NIOSH: — SAX: —	Toxic	—	—	—	4,000 HA	4,000 HA	100	—
Styrene §§ — § Styrol § Cinnamol § Cinnamene § Cinnamenol § NCI C02200 § Styrole § Strolene § Styron § Stropor § Vinylbenzol § Phenethylene § Phenylethene § Vinylbenzene § Ethenylbenzene § Phenylethylene § Benzene, Vinyl- § Styrene, Monomer	100425 or 100-42-5 NIOSH: WL 3675000 SAX: SMQ000	Carcinogen	—	—	—	100 HA	100 HA	N/A	0.5
Sulfometuron Methyl §§ Oust § —	74222-97-2	Toxic	—	—	—	1,750 I	1,750 I	0.01	—
Tebuthiuron §§ — § Spike	34014-18-1	Toxic	—	—	—	500 HA	500 HA	2	—
Temperature §§ —	N/A	Harmful	(13)	(13)	—	—	—	N/A	—
Terbacil §§ Sinbar § —	5902-51-1	Toxic	—	—	—	90 HA	90 HA	2.2	—
Terbufos §§ Counter § —	13071-79-9	Toxic	—	—	—	0.9 HA	0.9 HA	0.5	—
Tetrachlorobenzene, 1,2,4,5- §§ Benzene, 1,2,4,5-Tetrachloro- § RCRA Waste Number U207 § 1,2,4,5-Tetrachlorobenzene	95943 or 95-94-3 NIOSH: DB 9450000 SAX: TBN750	Toxic with BCF >300	—	—	1,125	0.97 NPP	0.97 NPP	N/A	0.1
Tetrachloroethane, 1,1,2,2- §§ Tetrachloroethane § TCE § Cellon § Westron § Bonoform § sym-Tetrachloroethane § RCRA Waste Number U209 § Acetylene Tetrachloride § 1,1,2,2-Tetrachloroethane § Ethane, 1,1,2,2-Tetrachloro- § 1,1-Dichloro-2,2-Dichloroethane	79345 or 79-34-5 NIOSH: KI 8575000 SAX: ACK500	Carcinogen	—	—	5	1.7 PP	2.0 HA	N/A	0.5

Appendix E

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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Tetrachloroethylene §§ Perchlorethylene § NCI C04580 § PCE § Perk § PERC § ENMA § Dow-Per § Perchlor § Perclene § Perklone § Didakene § Tetra Cap § Percosolve § Perchloroethylene § Tetrachloroethene § Carbon Bichloride § Carbon Dichloride § RCRA Waste Number U210 § Ethylene Tetrachloride § Ethylene, Tetrachloro- § 1,1,2,2-Tetrachloroethylene	127184 or 127-18-4 NIOSH: KX 3850000 SAX: TBQ250	Carcinogen	—	—	30.6	5 MCL	5 MCL	N/A	0.5
Thallium §§ Tl § Ramor	7440280 or 7440-28-0 NIOSH: XG 3425000 SAX: TEI000	Toxic	—	—	119	0.24 PP	2 MCL	0.3	0.2
Thifensulfuron Methyl §§ — § Pinnacle	79277-27-3	Toxic	—	—	—	910 1	910 1	1	—
Toluene §§ — § Antisal 1a § NCI C07272 § Toluol § Tolu-Sol § Methacide § Methylbenzol § Methylbenzene § Phenylmethane § Phenyl-Methane § Methyl-Benzene § Benzene, Methyl § RCRA Waste Number U220	108883 or 108-88-3 NIOSH: XS 5250000 SAX: TGK750	Toxic	—	—	10.7	1,000 MCL	1,000 MCL	0.01	0.5
Toxaphene §§ — § Attac 4-2 § Alltox § Alltex § Attac 6 § Toxakil § Agricide § Chem-Phene § Clor Chem T-590 § Compound 3956 § Crestoxo § Estonox § Geniphene § Gy-Phene § Hercules 3956 § Melipax § Motox § PCC § Phenacide § Phenatox § Toxadust § Campheehlor § Maggot Killer (F) § Toxaphene mixture § Chlorinated-Camphene § Camphene, Octachloro- § RCRA Waste Number P123	8001352 or 8001-35-2 NIOSH: XW 5250000 SAX: THH750	Carcinogen	0.73 PP	0.0002 PP	13,100	0.0028 PP	0.3 HA	N/A	1
Tralkoxydim (28) §§ Achieve	87820-88-0	Carcinogen	—	—	—	20 HA	20 HA	N/A	—
trans-1,2-Dichloroethylene §§ — § trans-Dichloroethylene § RCRA Waste Number U079 § trans-1,2-Dichloroethane § trans-1,2-Dichloroethene § Dichloroethylene, trans-§ trans-Acetylene Dichloride § 1,2-trans-Dichloroethylene § Ethene, 1,2-Dichloro-, (E)- § 1,2-Dichloroethylene, trans-	156605 or 156-60-5 NIOSH: KV 9400000 SAX: DFI600	Toxic	—	—	1.58	100 MCL	100 MCL	0.05	0.5
trans-1,3-Dichloropropene §§ Telone II § 1,3-Dichloroprapene § 1,3-Dichloropropylene § (E)-1,3-Dichloropropene § trans-1,3-Dichloropropylene § 1-Propene, 1,3-Dichloro-, (E)-	10061026 or 10061-02-6 NIOSH: UC 8320000 SAX: DGH000	Carcinogen	—	—	1.91	2 HA	2 HA	N/A	0.5
trans-Nonachlor (Chlordane component) §§ — § Chlordane, trans-Isomer	39765805 or 39765-80-5 NIOSH: — SAX: —	Carcinogen	—	—	14,100	0.0080 PP	1 HA	N/A	0.4
Triasulfuron §§ Amber	82097-50-5	Toxic	---	—	—	70 1	70 1	1	—
Tribenuron Methyl §§ Express	101200-48-0	Carcinogen	—	—	—	8 1	8 1	0.1	—

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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Raporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Tributyltin (TBT)	56573-85-4	Toxic	0.46 NPP	0.072 NPP	—	—	—	N/A	—
Trichlorobenzene, 1,2,4- §§ Benzene, 1,2,4-Trichloro- § unsym-Trichlorobenzene § 1,2,4-Trichlorobenzene	120821 or 120-82-1 NIOSH: DC 2100000 SAX: TIK250	Toxic	—	—	114	35 PP	70 MCL	0.02	0.5
Trichloroethane, 1,1,2- §§ Vinyl Trichloride § 1,1,2-Trichloroethane § B-T § Ethane Trichloride § beta-Trichloroethane § 1,2,2-Trichloroethane § RCRA Waste Number U227 § NCI C04579 § Ethane, 1,1,2-Trichloro- § Caswell Number 875A [NLM] § EPA Pesticide Chemical Code 081203 [NLM]	79005 or 79-00-5 NIOSH: KJ 3150000 SAX: TIN000	Carcinogen	—	—	4.5	3 HA	3 HA	N/A	0.5
Trichloroethane, 1,1,1- §§ Methyl Chloroform § -T § Strobane § Inhibisol § 1,1,1-TCE § Tri-Ethane § Solvent 111 § Acrothene TT § Chloroethene § Chlorten § NCI C04626 § Methylchloroform § Chloroform, Methyl- § 1,1,1-Trichloroethene § alpha-Trichlornethane § Methyltrichloromethane § RCRA WAste Number U226 § 1,1,1-Trichloroethane § Ethane, 1,1,1-Trichloro-	71556 or 71-55-6 NIOSH: KJ 2975000 SAX: TIM750	Toxic	—	—	5.6	200 MCL	200 MCL	0.5	0.5
Trichloroethylene §§ — § TCE § Triad § Vitran § Algylen § Dow-Tri § Lanadin § Vestrol § Anamenth § Benzinol § Tri-Plus § Tri-Clene § Trichlorethene § Trichloroethene § Trichloroethane § Trichlorethylene § Tetrachloroethene § Ethene, Trichloro- § Ethylene Trichloride § Ethylene, Trichloro- § Acetylene Trichloride § 1,1,2-Trichloroethylene § 1,2,2-Trichloroethylene § 1-Chloro-2,2-Dichloroethylene § 1, 1-Dichloro-2-Chloroethylene	79016 or 79-01-6 NIOSH: KX 4550000 SAX: TIO750	Carcinogen	—	—	10.6	5 MCL	5 MCL	N/A	0.5
Trichlorofluoromethane (HM) §§ Freon 11 § F 11 § FC 11 § Arcton 9 § Eskimon 11 § Halocarbon 11 § Algofrene Type 1 § RCRA Waste Number U121 § Fluorocarbon Number 11 § NCI C04637 § Isotron 11 § Fluorotrichloromethane § Isceon 131 § Monofluorntrichloromethane § Ucon Refrigerant 11 § Trichloromonofluoromethane	75694 or 75-69-4 NIOSH: PB 6125000 SAX: TIP500	Toxic	—	—	3.75	10,000 PP	10,000 PP	0.07	0.5
Trichlorophenol, 2,4,5- §§ Dowcide B § 2,4,5-Trichlorophenol § Norelle § Dowcide 2 § Collunosol § Preventol 1 § RCRA Waste Number U230 § NCI C61187	95954 or 95-95-4 NIOSH: SN 1400000 SAX: TIV750	Harmful	—	—	110	7 I	7 I	10	10
Trichlorophenol, 2,4,6- §§ Phenachlor § 2,4,6-Trichlorophenol § Dowcide 2S § RCRA Waste Number U231 § Omal § Phenol, 2,4,6-trichloro- § NCI C02904	88062 or 88-06-2 NIOSH: SN 1575000 SAX: TIW000	Carcinogen	—	—	150	14 PP	30 HA	N/A	10

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)

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Pollutant Element / Chemical Compound or Condition	CASRN, NIOSH and SAX Numbers	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17) (3)		Trigger Value (22)	Required Reporting
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Trichlorophenoxy Proprionic Acid, 2 (2,4,5-) §§ Fenoprop § 2 (2,4,5-Trichlorophenoxy) Proprionic Acid § Kuran § Propon § Silvex § Aqua-Vex § Ded-Weed § Sta-Fast § 2,4,5-TP § Color-Set § Weed-B-Gon § Double Strength § RCRA Waste Number U233 § 2,4,5-Trichlorophenoxypropionic Acid § (2,4,5-Trichlorophenoxy)Propionic Acid § 2-(2,4,5-Trichlorophenoxy)-Proprionic Acid § (+/-)-2-(2,4,5-Trichlorophenoxy)propanoic Acid	93721 or 93-72-1 NIOSH: UF 8225000 SAX: TIX500	Toxic	—	---	—	10 NRWQC	50 MCL	0.075	0.1
Trichlorophenoxyacetic Acid §§ Brush-Rhap § 2,4,5-T (Brush-Rhap)	93-76-5	Toxic	—	—	—	70 HA	70 HA	N/A	—
Triclopyr - amine salt §§ Garlon § —	55335-06-3	Toxic	—	—	—	350 1	350 1	0.25	---
Trifluralin §§ Treflan § Buckle	1582-09-8	Carcinogen	—	—	—	5 HA	5 HA	N/A	---
Trihalomethanes, total §§ --- § TTHMs	Multiple	Carcinogen	—	—	—	100 MCL	100 MCL	N/A	2
Turbidity (20) §§ —	N/A	Harmful	(13)	(13)	—	—	—	N/A	1 NTU
Uranium, natural §§ U § Uranium Metal, Pyrophoric	7440611 or 7440-61-1 NIOSH: YR 3490000 SAX: UNS000	Carcinogen / Radioactive	—	—	—	30 MCL	30 MCL	0.03	—
Vinyl 2-Chloroethyl Ether §§ Vinyl ß-Chloroethyl Ether- § (2-Chloroethoxy)Ethene § RCRA Waste Number U042 § 2-Chloroethyl Vinyl Ether	110758 or 110-75-8 NIOSH: KN 6300000 SAX: CH1250	Carcinogen	---	---	0.557	—	—	N/A	—
Vinyl Chloride §§ --- § VC § VCM § Chloroethene § Chloroethene § Chloroethylene § Chloroethylene § Ethylene, Chloro- § Monochloroethylene § Ethylene Monochloride § RCRA Waste Number U043 § Vinyl Chloride Monomer § Vinyl C Monomer § Trovidur	75014 or 75-01-4 NIOSH: KU 9625000 SAX: VNP000	Carcinogen	—	—	1.17	0.25 PP	0.2 HA	N/A	0.5
Xylenes §§ — § Xylol § Violet 3 § Mixed Xylenes § Methyl Toluene § Dimethylbenzene § RCRA Waste Number U239 § NCI C55232 § Total equals the sum of meta, ortho, and para.	1330207 or 1330-20-7 NIOSH: ZE 2100000 SAX: XGS000	Toxic	—	---	1.17	10,000 MCL	10,000 MCL	0.5	1.5
Zinc §§ Zn § Blue Powder § C.I. 77945 § C.I. Pigment Black 16 § C.I. Pigment Metal 6 § Emanay Zinc Dust § Granular Zinc § Jasad § Merrillite § Pasco § Zinc, Powder or Dust, non-Pyrophoric § Zinc, Powder or Dust, Pyrophoric	7440666 or 7440-66-6 NIOSH: ZG 8600000 SAX: ZBJ000	Toxic	37 @ 25mg/l hardness(12) PP	37 @ 25 mg/l hardness (12) PP	47	2,000 HA	2,000 HA	5	10

Appendix E

(1) Based on EPA's categories and include parameters determined to be to toxic (toxin), carcinogenie (carcinogen), or harmful. Harmful parameters include nutrients, biological agents, and those parameters which cause taste and/or odor effects or physical effects.

(2) Carcinogens are chemicals classified by EPA as carcinogens for an oral route of exposure in the drinking water regulations and health advisories (EPA 822-B-96-002) and those listed as carcinogens in the EPA priority pollutants list. Carcinogens include those parameters in classifications A (Human Carcinogens), B1 or B2 (Probable Human Carcinogens), and C (Possible Human Carcinogen).

(3) No surface water or ground water sample concentration shall exceed these values.

(4) No surface water or ground water average concentration shall exceed these values based upon a four-day (96-hour) or longer period.

(5) All bioconcentration factors (BCF's) were developed by the EPA as part of the Standards development as mandated by Section 304(a) of the federal Clean Water Act. National Recommended Water Quality Criteria: 2002 Human Health Criteria Calculation Matrix (EPA-822-R-02-012).

(6) The 24 hour geometric mean value must not exceed these values.

(7) Freshwater Aquatic Life Standards for total ammonia nitrogen (mg/l NH3-N plus NH4-N).

Because these formulas are non-linear in pH and temperature, the Standard is the average of separate evaluations of the formulas reflective of the fluctuations of flow, pH, and temperature within the averaging period; it is not appropriate to apply the formula to average pH, temperature and flow.

1. The one-hour average concentration of total ammonia nitrogen (in mg N/L) does not exceed the CMC (acute criterion) calculated using the following equations.

Where salmonid fish are present:

$$CMC = \frac{0.275}{1 + 10^{7.204 - pH}} + \frac{39.0}{1 + 10^{pH - 7.204}}$$

Or where salmonid fish are not present:

$$CMC = \frac{0.411}{1 + 10^{7.204 - pH}} + \frac{58.4}{1 + 10^{pH - 7.204}}$$

2. The thirty-day average concentration of total ammonia nitrogen (in mg N/L) does not exceed the CCC (chronic criterion) calculated using the following equations.

When fish early life stages[1] are present:

$$CCC = \left(\frac{0.0577}{1 + 10^{7.688 - pH}} + \frac{2.487}{1 + 10^{pH - 7.688}} \right) \times MIN\left(2.85, 1.45 \times 10^{0.028 \times (25 - T)}\right)$$

When fish early life stages[1] are absent:

$$CCC = \left(\frac{0.0577}{1 + 10^{7.688 - pH}} + \frac{2.487}{1 + 10^{pH - 7.688}} \right) \times 1.45 \times 10^{0.028 \times (25 - MAX(T,7))}$$

[1] Includes all embryonic and larval stages and all juvenile forms of fish to 30-days following hatching.

3. In addition, the highest four-day average within the 30-day period should not exceed 2.5 times the CCC.

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Table 1. pH-Dependent Values of the CMC (Acute Criterion) Ammonia Standard.

CMC, total ammonia nitrogen (mg/l NH_3-N plus NH_4-N)		
pH	Salmonids Present	Salmonids Absent
6.5	32.6	48.8
6.6	31.3	46.8
6.7	29.8	44.6
6.8	28.1	42.0
6.9	26.2	39.1
7.0	24.1	36.1
7.1	22.0	32.8
7.2	19.7	29.5
7.3	17.5	26.2
7.4	15.4	23.0
7.5	13.3	19.9
7.6	11.4	17.0
7.7	9.65	14.4
7.8	8.11	12.1
7.9	6.77	10.1
8.0	5.62	8.40
8.1	4.64	6.95
8.2	3.83	5.72
8.3	3.15	4.71
8.4	2.59	3.88
8.5	2.14	3.20
8.6	1.77	2.65
8.7	1.47	2.20
8.8	1.23	1.84
8.9	1.04	1.56
9.0	0.885	1.32

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Table 2. Temperature and pH-Dependent Values of the CCC (Chronic Criterion) for Fish Early Life Stages Present and for Fish Early Life Stages Absent.

pH	CCC for Fish Early Life Stages Present, total ammonia nitrogen (mg/l NH_3-N plus NH_4-N)										CCC for Fish Early Life Stages Absent, total ammonia nitrogen (mg/l NH_3-N plus NH_4-N)									
	Temperature, C										Temperature, C									
	0	14	16	18	20	22	24	26	28	30	0-7	8	9	10	11	12	13	14	15*	16*
6.5	6.67	6.67	6.06	5.33	4.68	4.12	3.62	3.18	2.80	2.46	10.8	10.1	9.51	8.92	8.36	7.8	7.35	6.89	6.46	6.06
6.6	6.57	6.57	5.97	5.25	4.61	4.05	3.56	3.13	2.75	2.42	10.7	9.99	9.37	8.79	8.24	7.72	7.24	6.79	6.36	5.97
6.7	6.44	6.44	5.86	5.15	4.52	3.98	3.50	3.07	2.70	3.37	10.5	9.81	9.20	8.62	8.08	7.58	7.11	6.66	6.25	5.86
6.8	6.29	6.29	5.72	5.03	4.42	3.89	3.42	3.00	2.64	2.32	10.2	9.58	8.98	8.42	7.90	7.40	6.94	6.51	6.10	5.72
6.9	6.12	6.12	5.56	4.89	4.30	3.78	3.32	2.92	2.57	2.25	9.93	9.31	8.73	8.19	7.68	7.20	6.75	6.33	5.93	5.56
7.0	5.91	5.91	5.37	4.72	4.15	3.65	3.21	2.82	2.48	2.18	9.60	9.00	8.43	7.91	7.41	6.95	6.52	6.11	5.73	5.37
7.1	5.67	5.67	5.15	4.53	3.98	3.50	3.08	2.70	2.38	2.09	9.20	8.63	8.09	7.58	7.11	6.67	6.25	5.86	5.49	5.15
7.2	5.39	5.39	4.90	4.31	3.78	3.33	2.92	2.57	2.26	1.99	8.75	8.20	7.69	7.21	6.76	6.34	5.94	5.57	5.22	4.90
7.3	5.08	5.08	4.61	4.06	3.57	3.13	2.76	2.42	2.13	1.87	8.24	7.73	7.25	6.79	6.37	5.97	5.60	5.25	4.92	4.61
7.4	4.73	4.73	4.30	3.78	3.32	2.92	2.57	2.26	1.98	1.74	7.69	7.21	6.76	6.33	5.94	5.57	5.22	4.89	4.59	4.30
7.5	4.36	4.36	3.97	3.49	3.06	2.69	2.37	2.08	1.83	1.61	7.09	6.64	6.23	5.84	5.48	5.13	4.81	4.51	4.23	3.97
7.6	3.98	3.98	3.61	3.18	2.79	2.45	2.16	1.90	1.67	1.47	6.46	6.05	5.67	5.32	4.99	4.68	4.38	4.11	3.85	3.61
7.7	3.58	3.58	3.25	2.86	2.51	2.21	1.94	1.71	1.50	1.32	5.81	5.45	5.11	4.79	4.49	4.21	3.95	3.70	3.47	3.25
7.8	3.18	3.18	2.89	2.54	2.23	1.96	1.73	1.53	1.33	1.17	5.17	4.84	4.54	4.26	3.99	3.74	3.51	3.29	3.09	2.89
7.9	2.80	2.80	2.54	2.24	1.96	1.73	1.52	1.33	1.17	1.03	4.54	4.26	3.99	3.74	3.51	3.29	3.09	2.89	2.71	2.54
8.0	2.43	2.43	2.21	1.94	1.71	1.50	1.32	1.16	1.02	0.897	3.95	3.70	3.47	3.26	3.05	2.86	2.68	2.52	2.36	2.21
8.1	2.10	2.10	1.91	1.68	1.47	1.29	1.14	1.00	0.879	0.773	3.41	3.19	2.99	2.81	2.63	2.47	2.31	2.17	2.03	1.91
8.2	1.79	1.79	1.63	1.43	1.26	1.11	0.973	0.855	0.752	0.661	2.91	2.73	2.56	2.40	2.25	2.11	1.98	1.85	1.74	1.63
8.3	1.52	1.52	1.39	1.22	1.07	0.941	0.827	0.727	0.639	0.562	2.47	2.32	2.18	2.04	1.91	1.79	1.68	1.58	1.48	1.39
8.4	1.29	1.29	1.17	1.03	0.906	0.796	0.700	0.615	0.541	0.475	2.09	1.96	1.84	1.73	1.62	1.52	1.42	1.33	1.25	1.17
8.5	1.09	1.09	0.990	0.870	0.765	0.672	0.591	0.520	0.457	0.401	1.77	1.66	1.55	1.46	1.37	1.28	1.20	1.13	1.06	0.990
8.6	0.920	0.920	0.836	0.735	0.646	0.568	0.499	0.439	0.386	0.339	1.49	1.40	1.31	1.23	1.15	1.08	1.01	0.951	0.892	0.836
8.7	0.778	0.778	0.707	0.622	0.547	0.480	0.422	0.371	0.326	0.287	1.26	1.18	1.11	1.04	0.976	0.915	0.858	0.805	0.754	0.707
8.8	0.661	0.661	0.601	0.528	0.464	0.408	0.359	0.315	0.277	0.244	1.07	1.01	0.944	0.885	0.829	0.778	0.729	0.684	0.641	0.601
8.9	0.565	0.565	0.513	0.451	0.397	0.349	0.306	0.269	0.237	0.208	0.917	0.860	0.806	0.756	0.709	0.664	0.623	0.584	0.548	0.513
9.0	0.486	0.486	0.442	0.389	0.342	0.300	0.264	0.232	0.204	0.179	0.790	0.740	0.694	0.651	0.610	0.572	0.536	0.503	0.471	0.442

*At 15 C and above, the criterion for fish ELS absent is the same as the criterion for fish ELS present

(8) A plant nutrient, excessive amounts of which may cause violations of Administrative Rules of Montana (ARM) 17.30.637 (1)(e).

(9) Approved methods of sample preservation, collection, and analysis for determining compliance with the standards set forth in DEQ-7 are found in the surface water quality standards (ARM17.30.601, et seq.) and the ground water rules (ARM 17.30.1001, et seq.).

Standards for metals (except aluminum) in surface water are based upon the analysis of samples following a "total recoverable" digestion procedure (Section 9.4, "Methods of Analysis of Water and Wastes", 1983, Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, EPA-600/4-79-020, or equivalent). Standards for alpha emitters, beta emitters and gamma emitters in surface waters are based upon the analysis of unfiltered samples and appropriate EPA approved analysis methods.

Standards for metals in ground water are based upon the dissolved portion of the sample (after filtration through a 0.45 µm membrane filter, as specified in "Methods for Analysis of Water and Wastes" 1983, Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, EPA-600/4-79-020, or equivalent). Standards for alpha emitters, beta emitters and gamma emitters in ground water are based upon the analysis of filtered samples and appropriate EPA approved analysis methods.

Standard for organic parameters in surface water and ground water are based on unfiltered samples.

(10) Calculation of an equivalent concentration of 2,3,7,8-TCDD is to be based on congeners of CDDs/CDFs and the toxicity equivalency factors (TEF) in Table 5 page 787 of van den Berg, M; Bosveld, ATC; et al. (1998) Toxicity equivalency factors (TEFs) for PCBs, PCDDs, PCDFs for humans and wildlife. Environ Health Perspect 106(12):775-792. The analysis method to be used is EPA Method 1613, Revision B, Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS), EPA Method 8290, or other method approved by the department on case by case basis. The Required Reporting Value(s) (RRV) for Dioxin and congeners are to be the lowest detection level for the analysis method approved by the Department.

(11) Radionuclides consisting of alpha emitters, beta emitters and gamma emitters are classified as carcinogens. Alpha emitters means the total radioactivity due to alpha particle emission. Beta emitters means the total radioactivity due to beta particle emission. Gamma emitters means the total radioactivity due to gamma particle emission. The emitters covered under this Standard include but are not limited to:

Cesium, radioactive Iodine, radioactive Strontium -89 and -90, radioactive Tritium Gamma photon emitters

(12) Freshwater Aquatic Life Standards for these metals are expressed as a function of total hardness (mg/l, CaCO3). The values displayed in the chart correspond to a total hardness of 25 mg/l. The hardness relationships are:

	Acute = exp.{ma[ln(hardness)]+ba}		Chronic = exp.{mc[ln(hardness)]+bc}	
	ma	ba	mc	Bc
cadmium	1.0166	-3.924	0.7409	-4.719
Copper	0.9422	-1.700	0.8545	-1.702
chromium (III)	0.819	3.7256	0.819	0.6848
Lead	1.273	-1.46	1.273	-4.705
Nickel	0.846	2.255	0.846	0.0584
Silver	1.72	-6.52	--------	---------
Zinc	0.8473	0.884	0.8473	0.884

Note: If the hardness is <25mg/L as CaCO3, the number 25 must be used in the calculation. If the hardness is greater than or equal to 400 mg/L as CaCO3, 400 mg/L must be used in the calculation.

(13) This standard is based upon Water-Use Classifications. See Administrative Rules of Montana (ARM), title 17, Chapter 30 - Water Quality, Sub-Chapter 6 - Surface Water Quality Standards.

(14) Freshwater Aquatic Life Standard for pentachlorophenol with pH. Values displayed in the chart correspond to a pH of 6.5 and are calculated as follows:
Acute = exp[1.005(pH) - 4.869] Chronic = exp[1.005(pH) - 5.134]

(15) Freshwater Aquatic Life Standard for dissolved oxygen in milligrams per liter are as follows:

	Standards for Waters Classified A-1, B-1, B-2, C-1, and C-2		**Standards for Waters Classified B-3, C-3, and I**	
	Early Life Stages[1,2]	**Other Life Stages**	**Early Life Stages[2]**	**Other Life Stages**
30 Day Mean	**N/A[3]**	**6.5**	**N/A[3]**	**5.5**
7 Day Mean	**9.5 (6.5)**	**N/A**	**6.0**	**N/A**
7 Day Mean Minimum	**N/A[3]**	**5.0**	**N/A[3]**	**4.0**
1 Day Minimum[4]	**8.0 (5.0)**	**4.0**	**5.0**	**3.0**

1 These are water column concentrations recommended to achieve the required inter-gravel dissolved oxygen concentrations shown in parentheses. For species that have early life stages exposed directly to the water column, the figures in parentheses apply.
2 Includes all embryonic and larval stages and all juvenile forms of fish to 30-days following hatching.
3 N/A (Not Applicable).
4 All minima should be considered as instantaneous concentrations to be achieved at all times.

(16) Aquatic Life Standards apply to surface waters only and are based upon the analysis of samples following a "total recoverable" digestion procedure (Section 9.4, "Methods for Analysis of Water and Wastes", 1983, Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, EPA-600/4-79-020, or equivalent).

(17) Source of the criteria used to derive the standard:

PP = priority pollutant criteria
NPP = non-priority pollutant criteria
MCL = Maximum contaminate level from the drinking water regulations
SMCL =secondary maximum contaminate level
HA = health advisory all from EPA's "Drinking Water Standards and Health Advisories" (October 1996)
I = standard derived from data obtained from federal data sources available on the Internet.
NRWQC = National Recommended Water Quality Criteria

(18) The Narrative Standards are located in the Administrative Rules of Montana (ARM) 17.30.601 et seq. and ARM 17.30.1001 et seq.

(19) The Required Reporting Value (RRV) is the detection level that must be achieved in reporting surface water or ground water monitoring or compliance data to the department unless otherwise specified in a permit, approval or authorization issued by the department. The RRV is the Department's best determination of a level of analysis that can be achieved by the majority of commercial, university, or governmental laboratories using EPA approved methods or methods approved by the department.

(20) Applicable to surface waters only.

(21) Based on taste and odor thresholds given in EPA 822-f-97-008 December 1997.

(22) Trigger Values are used to determine if a given increase in the concentration of toxic parameters is significant or non-significant as per the non-degradation rules ARM 17.30.701 et seq. The acronym "N/A" means "not applicable".

(23) The concentration of iron must not reach values that interfere with the uses specified in the surface and ground water standards (17.30.601 et seq. and 17.30.1001 et seq.) The Secondary Maximum Contaminant Level of 300 micrograms per liter which is based on aesthetic properties such as taste, odor, and staining may be considered as guidance to determine the levels that will interfere with the specified uses.

(24) The concentration of manganese must not reach values that interfere with the uses specified in the surface and ground water standards (17.30.601 et seq. and 17.30.1001 et seq.). The Secondary Maximum Contaminant Level of 50 micrograms per liter which is based on aesthetic properties such as taste, odor, and staining may be considered as guidance to determine the levels that will interfere with the specified uses.

(25) CASRN is an acronym for the American Chemical Society's Chemical Abstracts Service Registry Number.

(26) The NIOSH RTECS number is a unique number used for identification in the National Institute for Occupational Safety and Health (NIOSH) Registry of Toxic Effects of Chemical Substances.

(27) SAX number in the format AAA123 is a unique number for identification of materials in the Dangerous Properties of Industrial Materials, authors N. Irving Sax and Richard J. Lewis, publisher Van Nostrand Reinhold.

(28) The sum of the concentrations of tralkoxydim and its breakdown products shall not exceed the standards listed. For a list of known breakdown products, see EPA memorandum "EFED's Section 3 Review for Tralkoxydim (Chemical #121000; Case # 060780; DP Barcodes 0234682, 0234752, 0238697, 0235723 & 0239519)," and the associated "Environmental Fate Assessment for Tralkoxydim."

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(29) The Human Health water quality standard for Arsenic is as follows:
For surface water through January 22 2006 18 ug/L, Health Advisory based
For ground water through January 22 2006 20 ug/L, Health Advisory based
For surface water from **January 23 2006 10** ug/L, Maximum Contaminant Level based
For ground water from **January 23 2006 10** ug/L, Maximum Contaminant Level based

(30) Ground water human health standard is based on the relative poteney for seleeted PAH compounds listed in Table 8 of the EPA "Provisional Guidanee for Quantitative Risk Assessment of Polycyclie Aromatie Hydroearbons" July 1993, EPA/600/R-93/089.

Appendix F

DEPARTMENT OF ENVIRONMENTAL QUALITY
REMEDIATION DIVISION

Technical Guidance Document #7

Soil and Groundwater Action Levels for Petroleum Releases

* This document summarizes the VPH/EPH analytical methodology for petroleum contaminated soil and groundwater. These methods are an integral part of the Risk-Based Corrective Action (RBCA) approach used by the DEQ at petroleum release sites in Montana. Decisions regarding "how clean is clean?" are typically based on site-specific risk based factors (depth to groundwater and the existence of nearby receptors that could be impacted by the release), and are called Risk-Based Screening Levels (RBSLs).

* The following standards apply to corrective action associated with releases from petroleum storage tanks: 1) Montana Numerical Water Quality Standards (DEQ-7) for specific compounds such as benzene; and 2) TCLP if the contaminant could be classified as a hazardous waste.

* If a DEQ-7 standard exists, that standard is the clean-up requirement. For the aromatic and aliphatic fractions the RBSLs apply.

Implementation of the Volatile Petroleum Hydrocarbons (VPH) Method

The Montana Department of Environmental Quality (DEQ) has required the Volatile Petroleum Hydrocarbon (VPH) Method for analysis of soil and groundwater samples submitted to analytical laboratories since October 15, 1999. The VPH method replaced Gasoline Range Organics/ methyl tertiary butyl ether, benzene, toluene, ethylbenzene, xylenes, and naphthalene (GRO/MBTEXN) for all samples collected from sites where a release of gasoline, jet fuel JP-4, mineral spirits, Stoddard, crude oil, diesel, solvent, aviation gas or other similar petroleum products has or is thought to have occurred. DEQ decided to employ the VPH method because it provides a better analysis of the composition and environmental behavior of the contaminant and generates a better data set from which to evaluate health risks.

Soils
The RBCA Tier 1 soil targets are utilized for site assessments. The VPH analysis allows for direct comparison of the analytical results to the soil targets presented in the RBCA Tier 1 lookup tables. The soil targets were generated by the DEQ for the gasoline range aliphatic and aromatic hydrocarbon fractions, and MBTEXN using EPA risk equations, beneficial use criteria and soil leaching to groundwater modeling. The soil targets are protective of the Risk-Based Screening Levels (RBSLs) and Montana Numerical Water Quality Standards (DEQ-7) for groundwater, as well as dermal contact and ingestion pathways for surface soils.

Groundwater
Numerical water quality standards for MBTEXN plus RBSLs for aromatic hydrocarbon and aliphatic hydrocarbon fractions have been developed for groundwater. The RBCA Tier 1 groundwater RBSLs and numerical water quality standards are utilized for site assessments. The

VPH analysis allows for direct comparison of analytical results to the RBCA Tier 1 lookup table for groundwater.

Implementation of the Extractable Petroleum Hydrocarbons (EPH) Method

The DEQ has required the Extractable Petroleum Hydrocarbon Method (EPH) for analysis of soil and groundwater samples submitted to analytical laboratories since **October 15, 1999**. The EPH method has replaced DRO for all samples collected from a site where a release or a suspected release of diesel #1, diesel #2, jet-A, kerosene, waste oil, heating (fuel) oil #3-6, crude oil, mineral/dielectric fluids or other similar petroleum product has or is thought to have occurred. DEQ utilizes the EPH method because it provides a better analysis of the composition and environmental behavior of the contaminant and generates a better data set from which an evaluation of health risks can be made.

Soils

The RBCA Tier 1 soil targets are utilized for site assessments. **A concentration of 200 parts per million (ppm) Extractable Petroleum Hydrocarbons (EPH) Screen is used as the investigatory limit for site assessments at diesel release sites. 200** ppm coincides with the most conservative RBSL scenario for EPH (C11-C22 aromatics, surface soil, residential scenario, <10 feet to groundwater). The EPH method provides fractionation and polycyclic aromatic hydrocarbon (PAH) data, none of which are determined by the DRO method, plus the EPH analysis allows for direct comparison of the analytical results to the soil targets presented in the RBCA Tier 1 lookup tables. The soil targets were generated by the DEQ for the diesel range aliphatic and aromatic hydrocarbon fractions and PAHs using EPA risk equations, beneficial use criteria and soil leaching to groundwater modeling. The soil targets are protective of the RBSLs and HHSs for groundwater.

In an attempt to reduce the analytical costs for the EPH analysis the DEQ, in consultation with a number of regional laboratories, has adopted a two-step screening technique that is outlined in the EPH Method to evaluate soils at diesel #1, diesel #2, jet-A, kerosene, waste oil, heating (fuel) oil #3-6, crude oil, mineral/dielectric fluids or other similar petroleum product release sites. The first step in the screening technique is similar to a DRO analysis and generates an EPH Screen concentration. A concentration of 200 parts per million (ppm) has been selected for the screening action level. If the initial screening result is 200 ppm or less, then fractionation of the sample into aromatic and aliphatic fractions is not required. However, if the screening result is greater than 200 ppm, then the sample will be subjected to the EPH fractionation step and possibly PAH analysis (on a case by case basis). The purpose of using the screening technique is to eliminate performing a $240 analysis (EPH with PAHs) on a "clean" soil sample.

Extent and Magnitude of Soil Contamination

The extent and magnitude of a release is defined when the investigation through laboratory data obtained from excavations, test pits, or soil borings, etc. demonstrate that the contaminant concentrations are decreasing both horizontally and vertically to where there are no EPH or VPH RBSL exceedances.

Groundwater

Numerical water quality standards for PAHs plus RBSLs for the aromatic and aliphatic hydrocarbon fractions have been developed for groundwater. The RBCA Tier 1 groundwater Numerical water quality standards and RBSLs are utilized for site assessments. The EPH analysis allows for direct comparison of analytical results to the RBCA Tier 1 lookup table for groundwater. The RBSLs for the C11-C22 aromatic fraction and the C9-C18 aliphatic fraction are 1000 ppb and 500 ppb, respectively. The beneficial use threshold for the C19-C36 aliphatic hydrocarbons is 1,000 ppb. In RBCA Tier 1 scenarios, the summation of the analytical results for the three fractions cannot exceed the beneficial use criteria of 1,000 ppb TEH providing there are no individual fraction exceedances.

MBTEXN have been detected at diesel release sites at concentrations that exceed the DEQ–7 standards for those compounds. Consequently, VPH analysis is required in addition to the EPH method at all diesel release sites to analyze for MBTEXN and the C5-C8, C9-C12 aliphatic fractions and C9-C10 aromatic fraction.

PAH analysis for groundwater must be performed using EPA Method 8270.

Cost Reduction

To reduce analytical costs, the EPH screening technique is utilized. The screening technique approach is similar to that as described above for soils. On a case-by-case basis the EPH Screen concentration can be used in lieu of the TEH concentration derived after the silica gel extraction process to track contaminant contamination trends. Utilizing the EPH Screen approach eliminates the need to perform the significantly more expensive fractionation analysis.

Turn Around Times for VPH/EPH

Currently the rush turn around time for VPH is approximately 48 – 72 hours and for EPH, it is approximately 5 days. For diesel impacted sites, if the EPH screening technique is used, the turn-around time is estimated to be as rapid as 48 hours. The actual turn around times will depend on laboratory capabilities.

Analytical Requirements for Soils

Table 1 (below) outlines the analytical methods that are recommended for individual petroleum products. For example, VPH and EPH screen is required for the initial soil analysis for diesel #2. VPH will be run to determine the concentrations of MBTEXN and gasoline range aromatic and aliphatic fractions that are present in the soil. If the result of the EPH screening concentration is greater than 200 ppm then further analytical work is needed. The diesel range aliphatic and aromatic fractions will be obtained using the EPH fractionation step. PAH concentrations may be also be required on a site specific basis regardless of the EPH screen concentration.

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Table 1- Testing Procedures for Soils

Petroleum Product	VPH	EPH Screen	EPH Fractionation	EPH for PAHs	RCRA Metals	EPA Method 8260B for Volatiles	Oxygenates & Lead Scavengers
Gasoline/Aviation Gas	R						SS
Diesel #1	R	R	X				
Diesel #2	R	R	X				
#3- #6 Fuel Oils		R	X				
Waste Oil	R	R	X	SS	R	R	SS
Jet Fuel/Kerosene	R	R	X				
Jet Propellants (JP-4, JP-5, JP-8, etc.)	R	R	X				SS
Mineral/Dielectric Oils		R	X				
Heavier Wastes	SS	R	X	X			
Crude Oil	R	R	X	X			
Unknown Oils/Sources	R	R	X	SS	R	R	SS

R- required analysis

X - analysis to be run if the EPH screen concentration is >200 ppm TEH

SS- Site specific determination. Analysis may be required if the EPH screen concentration is >200 ppm TEH.

Analytical Requirements for Groundwater

The testing procedure for groundwater is somewhat similar to the approach used for soils. In Table 2, using diesel #2 as an example, the required analyses are VPH for MBTEXN and gasoline range aromatic and aliphatic fractions plus the EPH screen. The VPH analysis is required for all products that may contain volatile organic compounds. The EPH screening technique is employed to generate an EPH Screen concentration. If the EPH Screen concentration is greater than 500 ppb then additional EPH fractionation with or without PAH analysis may be required. PAH concentrations may be also be required regardless of the EPH screen concentration. The decision for requiring EPH fraction data and/or PAH analysis by EPA Method 8270 will be a site-specific determination.

Table 2- Testing Procedures for Groundwater

Petroleum Product	VPH	EPH Screen	EPH Fractionation	EPA Method 8270 for PAHs	EPA Method 8260B for Volatiles	Oxygenates & Lead Scavengers
Gasoline/Aviation Gas	R					SS
Diesel #1	R	R	SS	SS		
Diesel #2	R	R	SS	SS		
#3- #6 Fuel Oils		R	SS	SS		
Waste Oil	R	R	SS	SS	R	SS
Jet Fuel/Kerosene	R	R	SS	SS		
Jet Propellants (JP-4, JP-5, JP-8, etc.)	R	R	SS	SS		SS
Mineral/Dielectric Oils		R	SS	SS		
Heavier Wastes	SS	R	SS	SS		
Crude Oil	R	R	SS	SS		
Unknown Oils/Sources	R	R	SS	SS	R	SS

R - required analysis

SS – Site-Specific determination. Analysis may be required if the EPH screen concentration is >500 ppb TEH.

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